

In This Issue—How to Make a Flat Rate

# MOTOR AGE

Vol. XLIII  
Number 25

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CHICAGO, JUNE 21, 1923

Thirty-five Cents a Copy  
Three Dollars a Year



## Greater Dealer Profits In Complete Champion Line

The dealer who carries the complete line of Champion Spark Plugs makes certain of greater profits.

This is because the Blue Box Line is concentrated in seven numbers which, with Champion X, gives an assortment which will care for all calls for spark plugs.

The reduced number of types makes the investment of the dealer less and he realizes more profit because of the rapid turnover.

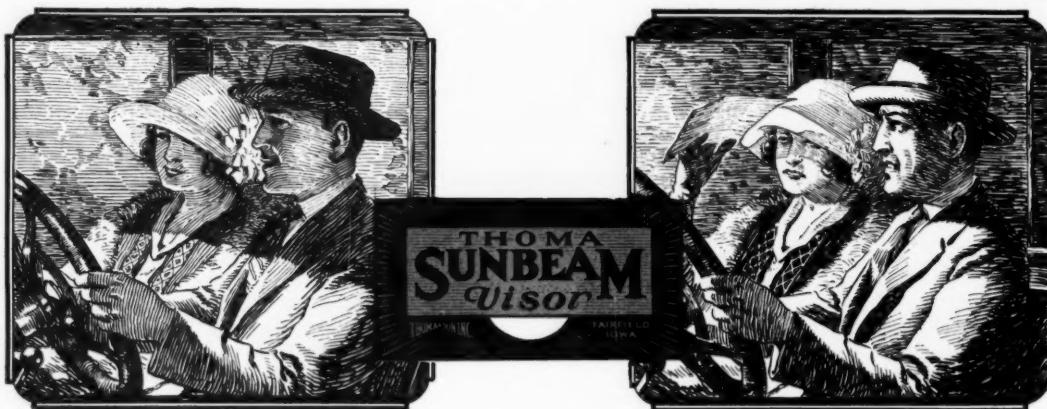
**Champion Spark Plug Company, Toledo, Ohio**

Champion Spark Plug Company of Canada, Ltd., Windsor, Ont.

*Back of Champion Spark Plugs is the greatest advertising campaign ever put back of an article of automotive equipment*

# CHAMPION

*Dependable for Every Engine*



# Dealers: Here's the Acid Test of the *Thoma SUNBEAM Visor*

*The only part of an automobile which does not deteriorate from years of service, is the glass in the windshield and bodies—"Eventually"—A GLASS VISOR.*

**I**F you want to know why the Sunbeam Visor has won a place of indisputable leadership among the forty or fifty types of Visors on the market, put one on your own car.

Compare the absolute comfort, convenience and safety it gives you with the discomforts, the eyestrain and the danger of driving against glaring sunlight and dangerous head lamps without it. If you will do that, you will sell the Sunbeam with more enthusiasm—and with more profit—than you ever sold any Visor before.

"SUNBEAM"—synonymous of the Peak Quality Visor. The last word in Engineering Construction—a Custom Built Visor for Every Make and Model Car. Ford parts will not fit a Packard car or vice-versa; neither will a Sunbeam Visor for Ford Cars, fit Packard Models. As a Class Car Distributor, give CLASS CAR SERVICE; sell and recommend to your clientele of car owners the SUNBEAM VISOR—Custom Built for your car.

#### SUNBEAM—DISTINCTIVE—A CLASS VISOR

Sunbeam Junior: Green, Amber and Blue Glass. For all Models, Chevrolet 490, Over-

land 4, Star and Ford Cars. Retails for \$9.00; West of Rockies—\$10.00.

Sunbeam "G"; Green, Amber and Blue Glass. Custom Built for all Makes and Model Cars; the Line for Class Car Distributors. Price \$12.00; West of Rockies—\$14.00.

Sunbeam "V": The new Product—VITRO-LITE (not glass) in "Royal Purple." VITROLITE IS A DISTINCTIVE SUNBEAM FEATURE. Retails for \$15.00; West of Rockies—\$16.50.

Sunbeam Visor DeLuxe: Full Nickeled Assembly for Smart Model Cars. Retails for \$24.00; West of Rockies \$25.00. Also furnished in triple Silver Plated Satin Finish for \$35.00, and Gold Plate Burnished at \$50.00.

*The Most Beautiful Visor in the World.*

MANUFACTURED BY

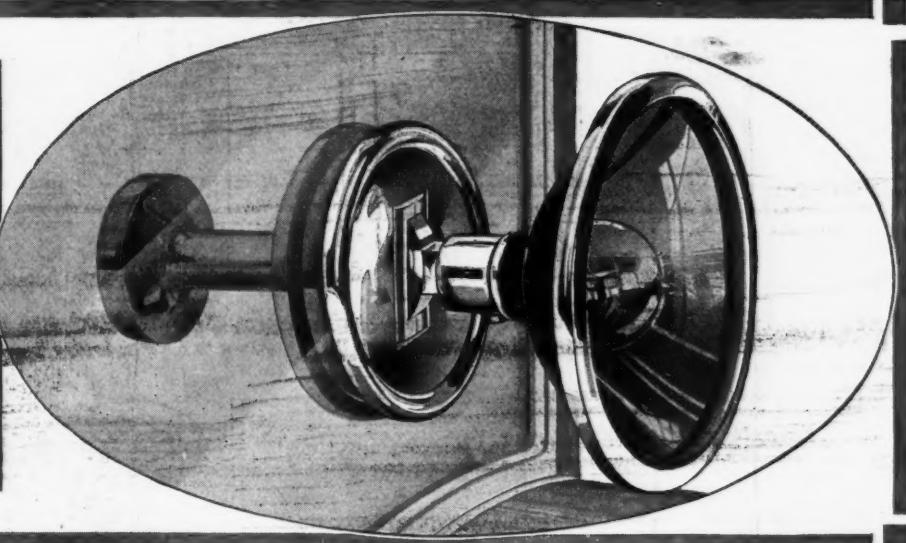
**THOMA & SON, INC.**  
Everything in  
Glass for the Automobile

Fairfield, Iowa

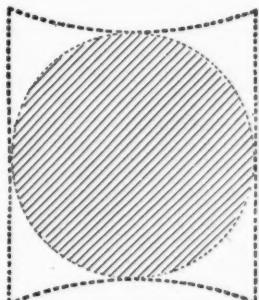
*For Sale by Leading Jobbers Everywhere*



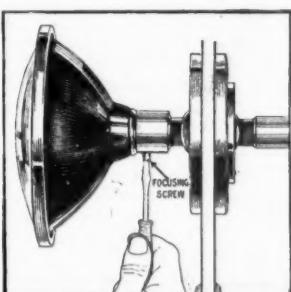
**The Home of the SUNBEAM VISOR—A Factory**



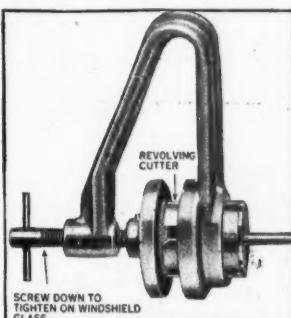
## Here's a New Inside Control Searchlight



The light range of the Stewart is not confined to a circle, but may be distributed over a much larger area, as indicated by the outside dotted line. This is a very important feature as it gives the Stewart a 25% greater light range.



The Stewart may be easily brought to any focus by a slight turn of the focusing screw, as shown. When once adjusted, this screw is held firmly in position by means of a lock nut.



This Stewart Installation Tool was designed especially for use by dealers. With it you can cut the hole in the windshield with little danger of breaking the glass and without the necessity of removing it from the car. Complete, \$5.25.

**The Many Advantages of the *Stewart***  
Make it a Profitable Addition to your Line

**A 25% Greater Light Range**—Made possible by the special design of swivel bearing. A distinctly Stewart feature.

**Improved Focusing Device**—Easily manipulated. A slight turn of the screw adjusts the strong beam of light to any focus desired.

**Best Quality Wiring**—Highly mercerized, extra flexible, parallel lamp cord. Connected to light at fore end of handle so as to offer no interference to operator.

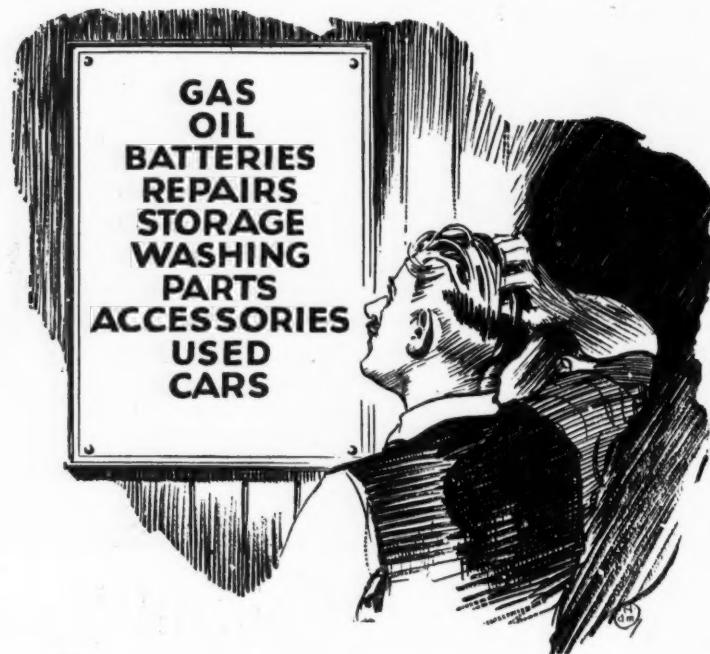
**Switch on Dashboard**—Finished in highly polished nickel; easily installed.

**Perfectly Balanced**—No matter how rough the roads, the Stewart Inside Control Searchlight stays in whatever position it is placed. Ease of operation can be regulated by adjustable friction screws.

Complete, with wiring and switch, \$10.00.

STEWART-WARNER SPEEDOMETER COR'N  
CHICAGO, U. S. A.

***Stewart***  
CUSTOMBILT ACCESSORIES  
USED ON 8 MILLION CARS



## Which department is "eating" my profits?

WHEN a garage owner loses money it is usually because he cannot put his finger on those departments which are losing more money than all his other departments can make.

**Burroughs Figures  
Point Out Which Departments  
Pay or Lose**

You can tell whether you are selling enough accessories every time you sell a new car. You can tell if you are making enough profit on those accessories, on your service, on your battery business, on parts, tires, gas or oil.

**You Can Analyze Department Sales  
with the Simplified Accounting Plan**

Besides giving you a daily statement of your business, this plan enables you to make a monthly statement of profit and expense for each department showing: sales, gross profits, direct expense, over-head and net profit.

**Better  
Figures  
make  
Bigger  
Profits**

# Burroughs

**ADDING ~ BOOKKEEPING ~ BILLING ~ CALCULATING MACHINES**

**The Simplified Accounting Plan  
Tells You These Things Every Day:**

Your cash on hand  
Your cash in bank  
What customers owe you  
What's owed you on notes  
What you owe on notes  
What you owe on purchases  
What cash you collect daily  
Your merchandise purchases to date  
Your cash sales each day  
Your charge sales each day  
Your total sales to date  
Your total expense to date

Ask your banker about the Simplified Accounting Plan. He uses Burroughs methods in his bank and he trusts the accuracy of Burroughs figures more than pen figures when loaning money.

Your name on the coupon and we'll gladly send an outline of the plan and the story of how well it succeeds in many garages.

**TEAR THIS OUT**

-----  
Burroughs Adding Machine Co.,  
6015 Second Blvd., Detroit, Mich.

Gentlemen: I am interested in the Simplified Accounting Plan for garages. Please send me further information.

Name.....

Address.....

.....

# MOTOR AGE

Reg. U. S. Pat. Off.

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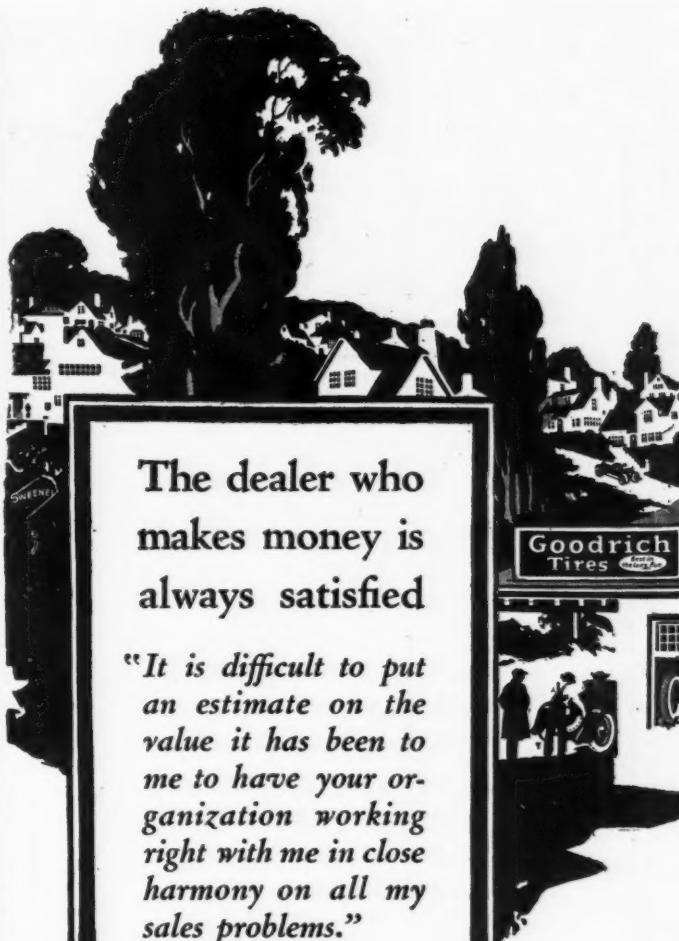
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## SUBSCRIPTION RATES

United States, Mexico and U. S. Possessions.....	\$ 3.00 per year
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Single Copies.....	.35 cents
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Entered as Second Class Matter Sept. 19, 1899, at the Post Office at Chicago, Ill., under Act of March 6, 1879.	



The dealer who makes money is always satisfied

*"It is difficult to put an estimate on the value it has been to me to have your organization working right with me in close harmony on all my sales problems."*

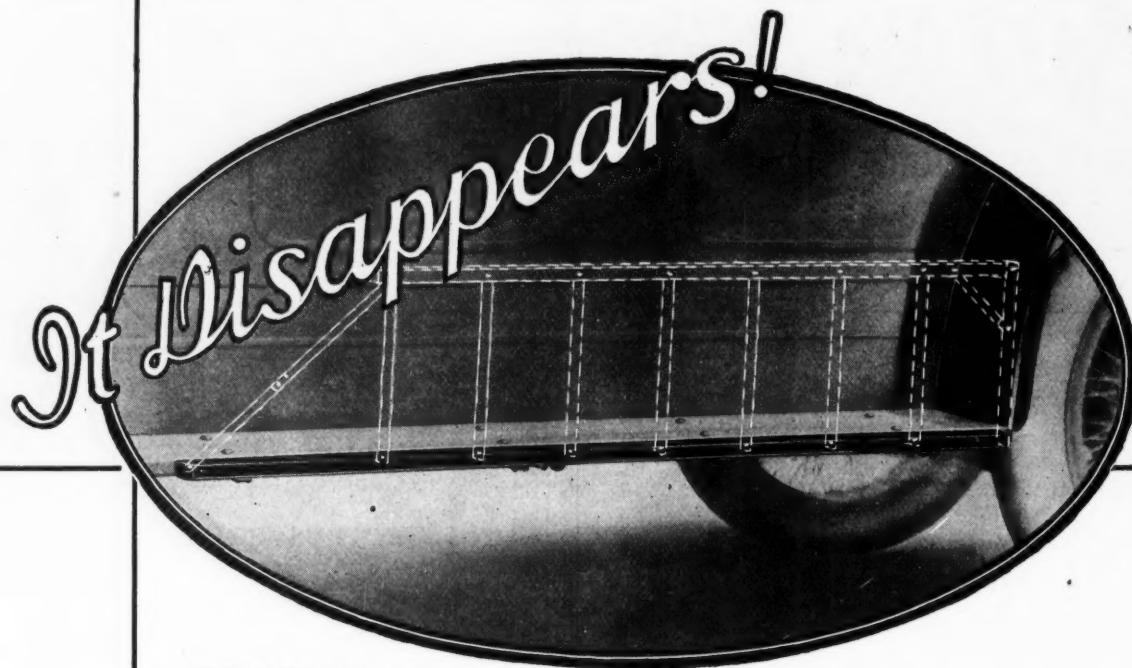
A Goodrich dealer writes the above in a letter to us. Hundreds of Goodrich dealers write in the same way. These letters are inspired by the intensive co-operation our field and factory organization give to the individual dealer who in turn works with us. The net result of this co-operation is expressed in one word—sales.

*Write for full information*

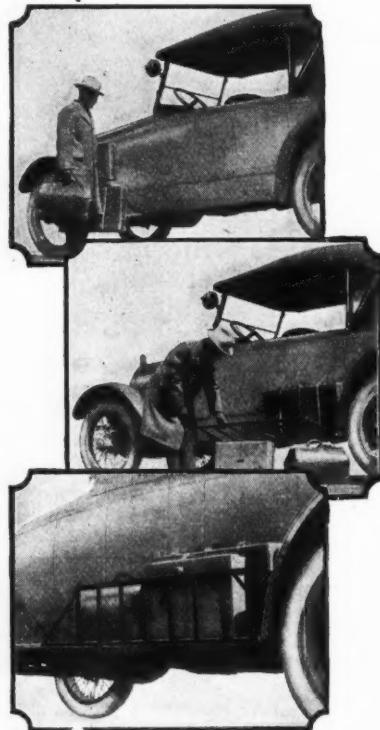
*The B. F. GOODRICH RUBBER CO.  
Akron, Ohio*

**Goodrich**  
**TIRES**

*"Best in the Long Run"*



GRIP RACK'S rich, black enamel — baked on — harmonizes with fine cars. GRIP RACK cannot rattle, loosen or break. No opening underneath to catch mud.



## New!—and Selling Fast!

SHOW a customer the Milwaukee GRIP RACK—self-enclosed (folded invisible at edge of running board); then, open (firm, roomy, good-looking) — and he will look no further for a luggage holder.

Hundreds of dealers are re-ordering. They've found that this new idea in luggage holders has a real appeal to men who take pride in their cars. The GRIP RACK is a permanent addition to the running board—re-inforces it. Useful the year 'round—always there when needed; never loose or lost. Slots provided so that luggage may be securely strapped to the GRIP RACK, away from the body of the car.

You can sell the GRIP RACK — in volume. Three sizes — fits all makes of cars. Finely-made — well-advertised — well-packed (individual cartons). Retails at \$5, \$6 and \$7.

Order GRIP RACKS from your jobber. Or write us for descriptive literature and proposition.

MILWAUKEE MOTOR PRODUCTS, INC.,  
MILWAUKEE, WISCONSIN

(Manufacturers of Quality Automotive Products for over 18 Yrs.)

M I L W A U K E E  
**GRIP RACK**  
MADE BY THE MANUFACTURERS OF THE MILWAUKEE TIMER

# STUDEBAKER



## The Best Dealer's Contract Ever Offered

The Studebaker contract is the fairest, squarest dealer contract ever written.

That is why you will find so many capable business men in the big Studebaker family—why the contract is so favorably regarded by bankers. Why, in fact, so many former bank executives have gone into the automobile business—with Studebaker.

That is also one reason why fewer Studebaker dealers go out of business probably than those handling any other line of cars.

Because of its many exclusive features and others which Studebaker was first to adopt, the Studebaker contract offers a genuine opportunity to business men.

But back of the contract, and Studebaker's seventy-one year reputation for honest manufacture and integrity, is another powerful factor—a vital factor—which is offered by no other manufacturer—a *complete line of Sixes*, ranging in price from \$975 to \$2750, and in capacity from two to seven passengers.

No wonder the Studebaker contract is so highly regarded by business men, bankers and everyone interested in the industry.

THE STUDEBAKER CORPORATION OF AMERICA  
South Bend, Indiana

MODELS AND PRICES—*f. o. b. factories*

LIGHT-SIX 5-Pass., 112" W. B., 40 H. P.	SPECIAL-SIX 5-Pass., 119" W. B., 50 H. P.	BIG-SIX 7-Pass., 126" W. B., 60 H. P.
Touring . . . . . \$975	Touring . . . . . \$1275	Touring . . . . . \$1750
Roadster (3-Pass.) . . . 975	Roadster (2-Pass.) 1250	Speedster (5-Pass.) 1835
Coupe-Road.(2-Pass.) 1225	Coupe (5-Pass.) 1975	Coupe (5-Pass.) 2550
Sedan . . . . . 1550	Sedan . . . . . 2050	Sedan . . . . . 2750

THIS IS A STUDEBAKER YEAR

*Nash Leads the World in Motor Car Value*

# Take, for Example, Yankton, S. D.

For a period of years Walsh Brothers of Yankton, South Dakota, have stood high as motor car merchants.

Last September they came to the conclusion that an affiliation with Nash was the wise move for them.

So they went after a Nash contract and since September 1, 1922, have handled the Nash line exclusively.

During their initial eight months they have retailed 59 new Nash cars.

And Yankton has but 5,024 people.

The total list price of the cars sold ran to nearly \$78,000 and they grossed a profit of over \$17,000.

Figures of this kind are enough to make any dealer not happy with his present line "*stop, look and listen.*"

And now is the time to make your change to Nash. Wire us about a territory for you that will fatten your bank roll.

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# NASH

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THE NASH MOTORS COMPANY  
KENOSHA, WISCONSIN

*Nash Leads the World in Motor Car Value*

(1704)

# ANNOUNCING



The Cole Motor Car Company announces the following net prices, effective as of June 1st, on the Cole Master Models, the new de luxe ultra creations which embody the last word in present day motor car fineness and luxury.

Royal Limousine, seven passenger \$3175.00  
 Royal Sedan, seven passenger.... 3075.00  
 Brouette, four-five passenger.... 3075.00  
 Imperial Coupe, four passenger.. 2750.00  
 Volante, four passenger..... 2175.00  
 Westchester, seven passenger.... 2175.00

#### COLE EIGHT NINETY MODELS

890 Touring, seven passenger... \$1885.00  
 890 Phaeton, four passenger.... 1885.00  
 890 Roadster, two passenger.... 1885.00

*All Prices F. O. B. Factory  
 Subject to federal tax*

# COLE

**COLE MOTOR CAR COMPANY, INDIANAPOLIS, U. S. A.**

*There's a Touch of Tomorrow in All Cole Does Today*



*A handful of the California Transit's fleet of Motor Stages spinning a net work of transportation throughout Central California, on Samson Super Cord Tires*

## The West's Largest Stage System 100% Samson Cord Equipped



Safety and long mileage economy were the important factors upon which the California Transit Company, after a test with all makes of tires, selected Samson Cords as standard equipment on its big fleet of fast passenger stages.

The non-skid efficiency of the Samson spells SAFETY—a factor that cannot be computed in terms of money. It has eliminated the dangers of mishaps on the long fast runs over the twisting, curving, fog and rain-soaked highways of Central California. In 3,250,000 miles of travel not one accident caused by skidding has occurred. The non-skid efficiency of the Samson is not even approached by any other make of tire.

For long mileage, the first essential of Schedule Maintenance and Tire Economy—Samson Cords have proven that they not only travel farthest, but never blow-out—they wear out long after other tires become worthless.

The figures compiled by the California Transit Company, covering almost a year's use of Samson Cords should be of interest to everyone who buys tires on a service value basis. Write for the facts.

SAMSON TIRE & RUBBER CORP.  
LOS ANGELES, CALIFORNIA

*In localities where Samsons are not already represented, Transportation concerns should communicate direct with manufacturers who will see that you are supplied.*

# SAMSON SUPER SIZE CORDS

# MOTOR AGE



## Flat Rate Is the Price of Your Maintenance

Flat Rate is an idea that must be reduced to practice to make it effective. At present the big idea is much embarrassed by a dispute as to details. It is a good deal as though the women of the country should say that a hat is an article of headgear made of felt or straw, and then should begin a discussion as to whether headgear made of wire and ribbon is a hat.

In the article that follows and those that will come later, there will be no effort to define Flat Rate as any particular bundle of details, but it is the endeavor to show what details may or may not be included in Flat Rate and the dealer can make up the rate from any of the materials suggested.

The idea that we wish to promote is that maintenance is something that can be sold at a positive price, just as the car or an accessory. Whatever method is used for the pricing, will, in our view, be Flat Rate.

We want to make the maintenance dealers of this country as resourceful as the milliners, so that they will sell hats, without discussing the materials.

# Elements of Flat Rate Merchandising

*In This, the First of a Series of Articles on the Subject, the Fundamentals and Definition of the System Are Discussed. The Several Items That Constitute Overhead Are Listed and a New Arrangement for Printing Flat Rates Is Introduced*

By PAUL DUMAS

THE crying need for improvement in the method of operating motor vehicle service stations has long been recognized and felt by the car driving public. The public has not been alone in its wishes because in the past there has existed more or less cause for dissatisfaction among all parties concerned, including the dealer in service or maintenance.

The fair minded among the car owning public have conceded the fairness of motive of the majority of recognized maintenance institutions while the other element has been wont to give way to prejudice and condemnation of the maintenance merchant as an individual.

**The trouble in reality has been with the system of conducting the business of maintenance and not with the individual.**

When both the buyer and seller of any commodity (and this is true of automotive maintenance) have just grounds for dissatisfaction, the development and improvement of methods in that business must inevitably occur or the business will perish.

The dealer in maintenance has most at stake and it is only logical that he take the first step and look for a corrective. Those who have been earnest in their search for something that would improve the lot of the dealer himself and incidentally the public have found the corrective. This corrective though old in other lines of business is new to maintenance and it is called, with more or less understanding, FLAT RATE MAINTENANCE.

It has the center of the stage just now and from all indications will continue so. In definition it is nothing more or less than selling a repair job by putting a price tag on it.

It all comes about by taking the second look at yourself and your business tactics and discarding the old viewpoint which made the car owner feel that when he brought his car to a maintenance institution he was hiring a man to work for him. The car owner has not been slow in realizing the benefits of flat rate and is now in the frame of mind where he will drive into the establishment of the dealer with the idea of buying a repair job. He wants to buy a repair job, and he has a right to know what that job is going to cost him, and right there is where the backward maintenance dealer is tempted to say "It can't be done."

The truth of the matter is that it can and is being done and with one large car producer printing the maximum time

allowances for repair jobs in its instruction book to owners, it is time for every merchant dealing in maintenance to get busy on a flat rate system.

The trend towards flat rate is no passing fancy. It is here to stay, and a list of the car makers who have compiled such a system for their dealers would probably startle those who are inclined to doubt its virtues.

The Packard Co. has standardized their service activities and at the present time over 90 per cent of the Packard dealers are using this system which includes the sales of repair work at flat rates.

The Cadillac Co. has several distributors who are operating on the flat rate basis and at the present time the factory service department is compiling a standard flat rate set of schedules for all Cadillac dealers.

These instances are mentioned here in order to show that the plan has appealed to car makers of the higher priced products.

Such firms as Dodge, Dort, Paige, Studebaker, Reo, Buick, and Oakland are representative companies that are fostering the flat rate system.

The flat rate system appeals to the thinking maintenance merchant from two main angles. First because of the increased profits it has produced for him and next because of the owner attitude that goes with this system. A harmonious attitude among car buyers in regard to maintenance is bound to show direct results in the sale of cars and an all-around beneficial effect to the industry.

Generally speaking, the maintenance department of the car distributor in a large city like Chicago carries a far higher overhead proportionately than the small town merchant. As a matter of fact, until the advent of the flat rate system it was not unusual for the large distributor to operate his maintenance department at a daily loss of as much as 50 cents per hour of each working day, per man. In other words they were selling mechanics' labor at the rate of \$1.50 per hour that was costing them \$1.90 to deliver.

Three years ago in the city of Chicago only two distributors' service departments, among the establishments representing the 10 best sellers, were operating at a profit. The other eight were showing a yearly deficit of from 5 to 20% on the investment. **TODAY, FOUR OF THESE ESTABLISHMENTS ARE OPERATING AT A PROFIT RANGING FROM 2**

to 16%. **THE OTHER SIX HAVE HAD THE FLAT RATE PLAN IN OPERATION FOR A SHORTER PERIOD AND ALL OF THEM ARE BREAKING EVEN OR SHOWING A PROFIT LESS THAN 2%.**

The flat rate plan has accomplished this result, which may well be called its greatest triumph, by increasing the hours of productive labor compared to the mechanics' labor paid for. It was done by reducing the overhead which means that a greater volume of work was produced from the same number of mechanics.

The majority of these distributors utilized the flat rate system of compensation to the mechanics and they have thus increased their earnings approximately 20% per man.

With these two systems of selling motor vehicle maintenance there has resulted a far better ratio between the mechanics' payroll hours and the productive hours and almost total elimination of COMEBACKS.

#### The Flat Rate Price Will Vary

There will be printed in MOTOR AGE from time to time schedules of flat rate operations on the popular makes of cars. They will be arranged in the same manner as the schedules printed in this article and will assume an hourly rate of \$1.35. To the dealer who is desirous of using these schedules, we would advise that they be reprinted or transferred to sheets on a loose leaf binder size 8½x11 or smaller. The figure of \$1.35 has been chosen as an average of the hourly rate to customers throughout the country and cannot be regarded as the correct figure for each individual institution, because of the varying conditions imposed by geographical location and size of the establishments.

Organizations engaged in the sale of motor vehicle maintenance vary in size from the one man shop to the distributor service station with as many as 300 men employed. From the maximum to the minimum size establishment we will find a wide variation

**In the size of the building.**

**In the magnitude of the personnel.**  
**In the condition of the labor market.**  
**In the extensiveness of the tool equipment.**

All of these conditions have a hand in determining the cost of operating the business which directly affects the selling price of a valve grinding job or any other operation on the motor vehicle.

The cost of doing business is the OVERHEAD of which we shall hear more later, in the meantime let us get back to the flat rate schedules.

#### Explaining the Schedules

The schedules as printed are the result of studies made over a period of time on the operation under consideration. They are taken from the factory service department figures of the cars listed and are not time studies made with a stop watch under ideal conditions. They are the average time required by average mechanics on at least six separate executions of the operation. The time allowances however, are based on the use of tool equipment best suited for the particular operation.

For instance, the operation of installing piston rings requires no elaborate equipment to execute efficiently but it is a certainty that the mechanic who has no socket wrenches, or who is forced to struggle with piston rings which can't handily be compressed by hand, is at a big time disadvantage. He certainly cannot insert the fitted rings into the cylinder bore as quickly as the mechanic who has a ring compressor tool. The same holds true of removing the old rings from the piston, an operation that can be done easier, faster, and safer by using a ring expander tool.

It will be found on all other operations where the flat rate is used that the tool equipment is one of the biggest factors in meeting and bettering the time allowance set down in the flat rate operation schedules.

#### What the Four Columns Are For

The reader will notice that the flat rate schedules printed in this article include the MAXIMUM TIME ALLOWANCE, LABOR CHARGE, PARTS PRICES and the TOTAL CHARGE and that a column is allotted for entries under each of these headings. This arrangement is intentional and is intended to allow the dealer to operate from the schedules either the FLAT RATE FOR LABOR ONLY system, the FLAT RATE FOR LABOR AND PARTS SYSTEM or the COMBINATION SYSTEM.

The FLAT RATE FOR LABOR AND PARTS SYSTEM is the ideal for which every high grade factory organization is striving. It is entirely feasible to operate on this system (which consists of including both labor and parts in the contract price to the owner) where the dealer has a car sales franchise in connection, and services that car exclusively.

To operate with this system it is absolutely necessary to have an adequate stock of parts for the car on which the operations are sold. The average small town dealer with a car sales agency may not be able to sell under this plan on all operations, unless he has the cooperation of a factory compiled flat rate book a parts department and well trained personnel.

The FLAT RATE FOR LABOR ONLY system has the greatest number of supporters at this stage of development be-

cause of the comparative ease with which the system may be installed.

With this method of selling, the contract price includes only the cost of the labor involved on a repair job. Most owner's complaints in the past have been directed to what they considered excessive charges for labor and, as this simple system entirely eliminates this, it is advised as the ideal system for the INDEPENDENT dealer who has no exclusive or official service institution.

It also can be used profitably by the dealer having official service rights on the car he sells but who also is engaged in the general motor vehicle maintenance business. In every case it should be the aim of the dealer to sell as close to the COMBINATION and FLAT RATE FOR LABOR AND PARTS SYSTEM as possible.

The COMBINATION system is fundamentally the same as the other two systems but derives its name from the fact that it permits more flexibility than the first mentioned system and is a closer approach to the ideal than the FLAT RATE FOR LABOR ONLY SYSTEM. With this system the TOTAL charge is given as the contract price on those operations where the material required is previously known and also the price of this material. Where these data are not available the system becomes the Flat Rate for Labor Only system.

All of the systems outlined above are FLAT RATE MAINTENANCE and the thing we are here calling "system" is nothing more than three methods of merchandising the thing called Flat Rate Maintenance.

The schedules as printed here may be considered as the MASTER SHEET from which data for compiling in various forms can be drawn. The parts column for the piston ring operation on the Maxwell has entries showing the price of piston rings, gaskets, and cylinder oil. DO NOT CONSIDER these prices as being the actual Maxwell price or the correct price for the same parts on other cars.

The entry under the parts price column is made to show the necessity of listing all parts that are certain to be required in arriving at the total charge. Additions could be made on the schedules for a space directly under the list of known parts necessary which would include the parts LIKELY TO require replacement. On major operations like a complete engine overhaul, it is advisable to list these likely parts with their prices, if known, and if these totals are added to the total price of the "known to be required" parts the dealer can give the car owner a MAXIMUM ESTIMATE of the total charge for the job.

This is merely offered as a suggestion because under certain conditions this list of likely parts requires considerable space on the master sheet. For the operation of installing new piston rings the list of likely parts might be something like this: "8 connecting rod bolts and

nuts, 1 cylinder head gasket, 6 oil pan cap screws, 1 new piston and 8 cylinder head stud nuts."

#### Compiling an Operation That Eliminates Guess Work

The flat rate maintenance system does not eliminate the necessity of a good technical or mechanical personnel. The man who sells the flat rate operation, whether he be an inspector, shop foreman, or service salesman, must be a good diagnostician. However, even the most logical diagnosis will sometimes fail to point the exact cause of trouble in a mechanism, so it is always better to play safe, and refrain from guessing, where there is the shadow of a doubt.

The flexibility of a properly compiled flat rate system of operations enables the dealer to sell the operation that will determine definitely the cause of any mysterious noise or knock. In case of doubt an operation similar to this one may be sold:

Operation No. 164M—Remove cylinder head and oil pan, remove carbon, remove and caliper pistons and cylinder walls to check fit. Check end play in cam shaft and crankshaft, inspect rods for straightness. Price \$7.00 labor only.

"An addition could be made to the items listed which would include checking the crankshaft main bearings, and cam followers, flywheel, etc., but the operation is given as printed in the flat rate book covering a popular priced car and will show how broadly a good flat rate can cover the majority of conditions possible in a modern motor vehicle mechanism. The dealer who is compiling his own flat rate may get up similar operations to cover unknown trouble in the rear axle or any other unit of the chassis.

#### The Scope of Motor Age Schedules

It is impossible for Motor Age to compile a complete flat rate book for every possible operation on every make of car. We might go a step further and state that it would be impractical to print the complete schedules for any one make of car.

Car manufacturers' flat rate books list as many as 2,000 different operations for one model and in cases where the reader is selling a car whose factory service department has already compiled such data it is to his advantage to secure their flat rate book.

The schedules that will be printed in the future will cover only the commonly executed operations, that is, those operations which are frequently done in the average shop. In this connection it should be borne in mind that the INDEPENDENT maintenance institution cannot meet all the flat rate operation prices on all the cars.

The institution with a car sales and service franchise is in a better position, other things being equal, to sell certain of the flat rate operations on its own make of cars than the independent.

It is certain, nevertheless, that the INDEPENDENT has a big field to draw

Operation No. 1 is the job of installing a full set of piston rings. Operation No. 2 covers the labor required to install rings on one piston. Operation No. 2 (a) is labor charge for installing rings on one piston when pan and head are removed. Operation No. 2 plus Operation No. 2 (a) for each cylinder will equal labor charge for Operation No. 1.

MAXWELL—After Car No. 193801						
Operation No.	Description of Job	Parts Prices	Max. Time	Labor Charges	Total Charge	
No. 1	REMOVE AND INSTALL PISTON RINGS, FULL SET. Includes removal and installation of cylinder head and oil pan.					
	12 piston rings @ \$0.40.....	\$4.80				
	2 gal. oil @ \$1.10.....	2.20				
	1 oil pan gasket @ .20.....	.20	6 hrs.	\$8.10	\$15.30	
	Use Maxwell oil pan wrench No. M30, and pilot expansion reamer, $\frac{3}{16}$ or $13/16$ in. for piston pins depending on model.					
No. 2	REMOVE AND INSTALL PISTON RINGS ON ONE PISTON. Includes removal and installation of cylinder head and oil pan.		3 hrs.	\$4.05	\$ 6.25	
	MATERIAL					
	Same as operation No. 1 less price of 9 rings.....	1.20				
	(a) EACH ADDITIONAL SET RINGS.....	1.20	1 hr.	\$1.35	\$ 2.55	
	(b) NEW PISTONS OR PINS IN CONNECTION WITH OPERATION, No. 1 or No. 2, each (pin).....	.30	$\frac{1}{2}$ hr.	.70	1.00	
	Each (piston).....	2.00	$\frac{1}{2}$ hr.	.70	2.70	
	Operations No. 1 and No. 2 are performed as follows:					
	Item 1. Drain oil from engine.					
	2. Raise hood.					
	3. Remove cylinder head					
	4. Remove oil pan.					
	5. Mark rods and caps, if not marked, for replacement into cylinder from which removed.					
	6. Remove connecting rod bearing caps and replace nuts on rod to hold shims.					
	7. Remove piston and rod assemblies.					
	8. Remove piston rings from piston.					
	9. Clean piston and ring grooves.					
	10. Fit rings to cylinder bore or cylinder gage.					
	11. Fit rings to grooves in piston.					
	12. Oil piston and compress rings with ring inserter sleeve.					
	13. Place piston in cylinder and remove sleeve.					
	14. Wash oil pan and pump screen.					
	15. Inspect oil pan gasket and renew if necessary.					
	16. Reassemble in opposite order of disassembly.					
	17. Fill oil reservoir to level.					
	DODGE	Parts Prices	Max. Time 6 $\frac{3}{4}$ hrs.	Labor Charges \$9.12	Total Charge	
No. 1	MATERIAL					
	12 piston rings.					
	2 gals. oil.					
	1 oil pan gasket.					
No. 2	MATERIAL					
	Same as operation No. 1 less price of 9 rings.					
	(a) Pins.					
	(b) OPERATION TO BE PERFORMED SAME AS MAXWELL.					
	OAKLAND—Models 34B-C-D and 6-44.					
	Operation No. 1	Description of Job	Parts Prices	Max. Time 4 $\frac{1}{4}$ hrs.	Labor Charges \$5.40	Total Charge
	MATERIAL					
	18 piston rings.					
	2 gals. oil.					
	1 oil pan gasket.					
No. 2	MATERIAL					
	Same as operation No. 1 less 16 piston rings.					
	(a) Pins.					
	(b) OPERATION TO BE PERFORMED SAME AS MAXWELL.					

Operation No.	Description of Job	Parts Prices	Max. Time 5½ hrs.	Labor Charges \$7.45	Total Charge	Operation No. 1	Description of Job	Parts Prices	Max. Time 9 hrs.	Labor Charges	Total Charge
1	MATERIAL 12 piston rings. Cyl. oil. 1 oil pan gasket.										
No. 2	MATERIAL Same as operation No. 1 less 9 piston rings. (a) Pins. (b) Use socket wrenches Walden Nos. 732-2716-6016.		3 hrs.	\$4.05		No. 2	Model 126-133 116		3.8 hrs. 4.3 hrs.	\$5.15 5.81	
	OPERATION TO BE PERFORMED SAME AS MAXWELL.		5/6 hrs. ½ hr. .70	1.15 1.35 1.35		(a)			1 hr.	1.35	
	Use socket wrenches Walden Nos. 732-2716-6016.					(b)					
	Four Cylinder, Series 19sh. Six Cyl. Series 19-20 Big 6EG. Series 19 Light Six EH, Series 20 Special 6 EH.										
Operation No. 1	Description of Job	Parts Prices	Max. Time	Labor Charges	Total Charge	No. 1	Drain radiator, remove bonnet, head lamps assembly, Delco head and wiring assembly.				
	MATERIAL 12-18 piston rings. Cyl. oil. 1 oil pan gasket.		6 cyl. 6 hrs. 6 cyl. 8 hrs.	\$ 8.10 10.80			2. Losen radiator and fan belt.				
No. 2	(a) Pins. (b)		6 cyl. 3 hrs. 1 hr.	\$ 4.05 4.05			3. Remove fan belt and disconnect gas lines and controls.				
	CHEVROLET—Models 490 and FB.						4. Remove vacuum tank and cylinder head.				
Operation No. 1	Description of Job	Parts Prices	Max. Time 5 hrs.	Labor Charges \$6.75	Total Charge		5. Disconnect exhaust pipe.				
	MATERIAL 12 piston rings. Cyl. oil. 1 oil pan gasket.						6. Remove block.				
No. 2	(a)						7. Remove oil pan.				
	PROCEDURE SAME AS ON MAXWELL.						From here on the procedure is same as on Maxwell except that connecting rods are lined on jig and pistons are rounded up if micrometers show out of round condition. Packard special exhaust manifold wrench, and special block wrench required.				
	STEPHENS—All Models.										
Operation No. 1	Description of Job	Parts Prices	Max. Time 8 hrs.	Labor Charges \$10.80	Total Charge						
	MATERIAL 18 piston rings. Cyl. oil. 1 oil pan gasket.										
No. 2	(a) Pins. (b)										
	THIS OPERATION TO BE PERFORMED SAME AS MAXWELL.										
	CADILLAC—All 8 Cyl. Models.										
Operation No. 1	Description of Job	Parts Prices	Max. Time 12 hrs.	Labor Charges \$17.55	Total Charge	No. 2	PAIGE—6-66 2nd and 3rd Series.				
	MATERIAL 24 piston rings. Cyl. oil. 1 oil pan gasket.						JEWELL—6-50 First Series.				
No. 2	(a) Pins. (b)						Parts Prices				
	THIS OPERATION TO BE PERFORMED SAME AS MAXWELL.						Max. Time				
	CADILLAC—All 8 Cyl. Models.						9 hrs.				
Operation No. 1	Description of Job	Parts Prices	Max. Time	Labor Charges	Total Charge	No. 2	Labor Charges				
	MATERIAL 24 piston rings. Cyl. oil. 1 oil pan gasket.		1 hr. 1 hr. 1 hr.	1.35 1.35 1.35			\$12.15				
No. 2	(a) Pins. (b)										
	THESE OPERATIONS TO BE PERFORMED SAME AS MAXWELL.										
	THESE OPERATIONS TO BE PERFORMED SAME AS MAXWELL, except that on early models piston plugs are removed instead of cylinder head.										

PACKARD—Single Six Only, Models 116-126-133.											
Operation No. 1	Description of Job	Parts Prices	Max. Time	Labor Charges	Total Charge	Operation No. 1	Description of Job	Parts Prices	Max. Time	Labor Charges	Total Charge
	MATERIAL 24 piston rings. Cyl. oil.		3 hrs.	\$4.05		No. 2	Model 126-133 116		3.8 hrs. 4.3 hrs.	\$5.15 5.81	
	Model 116 has 3 ring pistons.					(a)					
						(b)					
	THIS OPERATION IS PERFORMED AS FOLLOWS:										
	STUDEBAKER										
	Four Cylinder, Series 19sh. Six Cyl. Series 19-20 Big 6EG. Series 19 Light Six EH, Series 20 Special 6 EH.										
Operation No. 1	Description of Job	Parts Prices	Max. Time	Labor Charges	Total Charge	No. 1	Drain radiator, remove bonnet, head lamps assembly, Delco head and wiring assembly.				
	MATERIAL 12-18 piston rings. Cyl. oil. 1 oil pan gasket.		6 cyl. 6 hrs. 6 cyl. 8 hrs.	\$ 8.10 10.80			2. Losen radiator and fan belt.				
No. 2	(a) Pins. (b)		6 cyl. 3 hrs. 1 hr.	\$ 4.05 4.05			3. Remove fan belt and disconnect gas lines and controls.				
	CHEVROLET—Models 490 and FB.						4. Remove vacuum tank and cylinder head.				
Operation No. 1	Description of Job	Parts Prices	Max. Time 5 hrs.	Labor Charges \$6.75	Total Charge		5. Disconnect exhaust pipe.				
	MATERIAL 12 piston rings. Cyl. oil. 1 oil pan gasket.						6. Remove block.				
No. 2	(a)						7. Remove oil pan.				
	PROCEDURE SAME AS ON MAXWELL.						From here on the procedure is same as on Maxwell except that connecting rods are lined on jig and pistons are rounded up if micrometers show out of round condition. Packard special exhaust manifold wrench, and special block wrench required.				
	STEPHENS—All Models.										
Operation No. 1	Description of Job	Parts Prices	Max. Time 8 hrs.	Labor Charges \$10.80	Total Charge						
	MATERIAL 18 piston rings. Cyl. oil. 1 oil pan gasket.										
No. 2	(a) Pins. (b)										
	THIS OPERATION TO BE PERFORMED SAME AS MAXWELL.										
	CADILLAC—All 8 Cyl. Models.										
Operation No. 1	Description of Job	Parts Prices	Max. Time	Labor Charges	Total Charge	No. 2	PAIGE—6-66 2nd and 3rd Series.				
	MATERIAL 24 piston rings. Cyl. oil. 1 oil pan gasket.		1 hr. 1 hr. 1 hr.	1.35 1.35 1.35			JEWELL—6-50 First Series.				
No. 2	(a) Pins. (b)						Parts Prices				
	THIS OPERATION TO BE PERFORMED SAME AS MAXWELL.						Max. Time				
	CADILLAC—All 8 Cyl. Models.						9 hrs.				
Operation No. 1	Description of Job	Parts Prices	Max. Time	Labor Charges	Total Charge	No. 2	Labor Charges				
	MATERIAL 24 piston rings. Cyl. oil. 1 oil pan gasket.		12 hrs.	\$17.55			\$12.15				
No. 2	(a) Pins. (b)										
	THESE OPERATIONS TO BE PERFORMED SAME AS MAXWELL.										
	THESE OPERATIONS TO BE PERFORMED SAME AS MAXWELL.										

The operation of installing piston rings can be sold on a flat rate on any car of standard construction. All engines must come under one or the other of two types of construction, the type that requires removal of the pistons either from below or through the top. The time required on the piston ring operation on any car is almost entirely dependent on this factor and cars having both constructions are listed in these schedules.

Motor Age is indebted to the factory service department of the cars listed above for data printed in these schedules.

from, just now at any rate, but that sooner or later he will be forced to conduct his business on a flat rate system.

The same holds true of the institution with car sales franchise having a maintenance department that caters to its own and other makes of cars. The last named type of dealer represents the majority in numbers of institutions, selling maintenance, and to this type of organization the forthcoming schedules will be especially applicable.

#### The Items That Make Up Overhead

Before the dealer in maintenance can set his hourly rate from which he will compile his flat rate prices he must have a close estimate of his OVERHEAD costs. To guide the average dealer we are listing below all of the items that should be charged to overhead. They are arranged from data supplied by the Packard Technical Service Dept.

##### Item No. 1—NO CHARGE SERVICE

Covers labor and material used in extending free service to owners. Faulty workmanship by mechanics, avoidable mistakes.

##### No. 2—SHOP SUPPLIES

Covers sundry supplies purchased for use in the shop, such as wiping cloths, waste, kerosene, cleaning solutions, gasoline, boots, sand and emery paper, soap, welding compound, oxygen, acetylene, brooms, brushes, wash room supplies, pails, mops, wrapping paper, twine, nails, cartons, etc.

##### No. 3—REPAIRS TO BUILDINGS, FIXTURES AND EQUIPMENT

Covers labor and material used in repairs to elevators, air compressors pipe lines, heating equipment, electric equipment, machinery including lathes, drill presses, etc., building, furniture, fixtures, etc.

##### No. 4—POWER, LIGHT, HEAT AND WATER

Covers electric current, gas, coal, wood and other fuel and water.

##### No. 5—MISCELLANEOUS EXPENSE

Covers expense items that can not properly be charged to any other expense account.

##### No. 6—RENT

Covers all rental expense including extra storage space when rented.

##### No. 7—STATIONERY AND OFFICE SUPPLIES

Covers printed forms, bound books, letter heads, pencils, pens, carbon paper, typewriter and cash register supplies, etc.

##### No. 8—TELEPHONE AND TELEGRAPH AND POSTAGE

Covers switchboard rental, longdistance and local service, cost of all telegrams and postage.

##### No. 9—RECEIVING AND SHIPPING

Covers all incoming transportation charges including freight, drayage, express, parcel post, etc., or items not directly chargeable to customer.

##### No. 10—ADVERTISING

Covers all accounts expended for advertising of any nature.

##### No. 11—SUPERVISION

Covers salaries and wages of Managers and Assistants.

##### No. 12—SHOP LABOR

Covers all amounts paid to mechanics, helpers, washers, etc.

##### No. 13—GENERAL LABOR

Covers all amounts payable to porters, watchmen, elevator operators and general labor.

##### No. 14—CLERKS AND STENOGRAPHERS

Covers salaries or wages of clerks and stenographers. This includes shop clerks, order takers, stockroom clerks, etc.

##### No. 15—COMMISSIONS

Covers commissions paid mechanics etc., for accessories sold by them to car owner.

##### No. 16—INSURANCE AND TAXES

Covers all amounts paid out for insurance and taxes.

##### No. 17—DEPRECIATION

Covers monthly charges for depreciation of buildings, equipment, furniture, fixtures, machinery, tools, etc.

##### No. 18—DOUBTFUL ACCOUNTS

Covers monthly charges outstanding for accounts receivable that may be uncollectable due to customer's financial irresponsibility.

Especial attention is directed to overhead items No. 1, 2, 3, 4, 5, 8, 9, 11, 14, 17, and 18. These are the commonest sources of overhead expense, nevertheless they are often overlooked.

After you have determined as closely as possible the monthly and yearly overhead you are prepared to set the hour rate for compiling your flat rate schedules. The OVERHEAD subtracted from the selling price of your total productive labor represents the NET PROFIT.

In conclusion it is well to always bear in mind the following few thoughts regarding flat rate maintenance:

Make up your flat rate schedules on an hourly basis but sell them to the owner from a book that quotes the time in dollars and cents.

Use common sense judgment in estimating a job. If you don't know the exact cause of the knock sell the operation that will enable you to give the unit an internal inspection.

Don't attempt to give a complete flat rate price for labor and material. Excessive charges for labor are the main complaints from the car owners and if you can sell labor on a flat rate plan it will not be difficult to secure the owners O. K. on any parts that may be required on the operation sold.

Base certain of your operations that require only unskilled and semi-skilled labor on a lower hourly rate than you would charge for strictly skilled labor. This applies particularly to operations that may be done by the owner but which if sold reasonably will tend to reduce the owner's yearly maintenance costs. Such operations are oiling and greasing, washing, cleaning carbon, and tire repair work.

Have the shop arranged for speed in production.

Always bear in mind that a car owner wants his car when he wants it and arrange your work so that chronic delays on delivery are eliminated.

The service salesman, inspector, or whoever sells the work to the customer should not be too hasty in giving the price of the job. Even though the salesman knows, without lifting the hood, exactly what is needed, he should not simply turn to the customer and say "\$3.50 for the job." Rather let him lift the hood and at least go through the motions of making an inspection before telling the customer what the cost will be. A watchmaker may know a main spring is broken when you hand him your watch, but you feel at lot better about the transaction when he examines it with his eye glass and then tells you the trouble, what it will cost to fix it and when you can have the watch.

## 23 Years Ago This Week In Motor Age

(From MOTOR AGE of June 21, 1900.)

### Gordon-Bennett Cup Race

Charron won the race.

France retains the challenge cup.

The one American competitor made a plucky and creditable showing.

As was generally expected the Gordon-Bennett cup, the massive silver trophy offered by the enthusiastic American chauffeur and proprietor of the New York Herald, with its Paris edition, was won by a Frenchman and will be held by the Automobile Club of France until a challenge is issued by the representative club of some other country.

Considerable uncertainty as to the date that the race was to be run was caused by the "war on automobiles" that was recently inaugurated by the French officials, as it was a question whether or

not a permit could be obtained for the holding of the race over the Paris-Lyon Course, a distance of 351 miles.

Those who finally started in the race were Charron, Rene de Knyff and Girardot, representing France; Jenatzy, representing Belgium, and Alexander Winton representing America, the German competitor withdrawing at the last moment. (The winner's time was 9 hours, 9 minutes and 49 seconds.)

### They Called It Sparking Plug

The Crest Mfg. Co., of Cambridgeport, Mass., manufacturers of Crest motors for automobiles, are putting on the market a radically new design of sparking plug that is not affected by the heat and expansion and is claimed to be unbreakable.

# Boiler Chief Feature of Q. E. D. Steam Motor Bus

*In Spite of Slightly Greater Weight, Fuel Cost Per Mile Is Said to Be Around 2.2 Cents. Rapid Acceleration and Freedom From Vibration Characteristics in Performance of Vehicle*

WITH a view to obtaining freedom from vibration at all speeds, smooth and rapid acceleration, fuel economy together with other known advantages of steam, a steam motor bus called the Q. E. D. has been developed in Chicago by the Steam Bus Syndicate of Chicago.

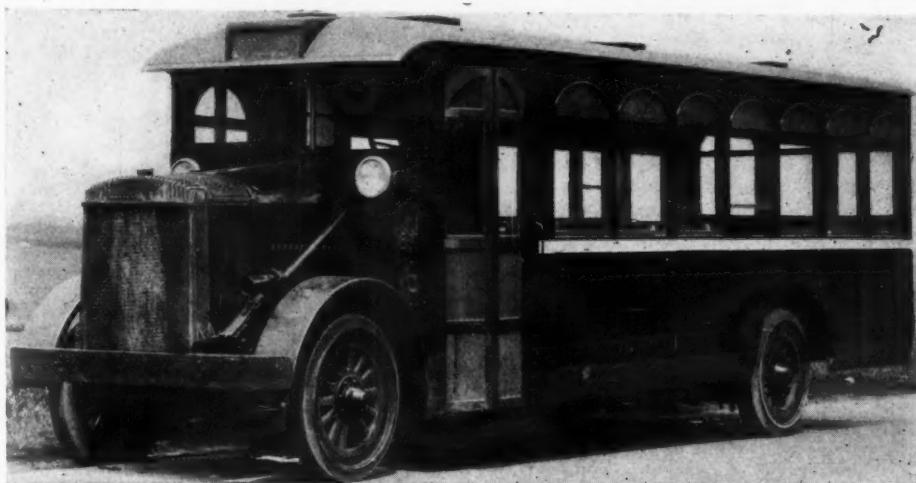
Inasmuch as the entire success of a steam driven motor coach depends on the boiler, naturally the major part of the development work and design has centered around this unit. The bus uses the Winslow boiler.

#### *Construction of Winslow Boiler*

The Winslow boiler is of the water tube type and is sectional in construction, that is, the boiler is made up of several units, each being a complete boiler in itself. The water stands about half way up the section when cold but naturally rises upon the application of heat. As the heat application is continued generation of steam takes place more rapidly and the movement of the water increases in velocity, both conditions causing a rapid flow of water through the lower tubes. This rapid flow of circulation is the cause of the non-scaling feature of the Winslow boiler. Sediment which will precipitate in any steam generator, in the case of the Winslow boiler is swept out of the path of circulation and settles into the mud collector.

#### *Operation of Burner Control*

The burner control consists of an elec-



*The Q. E. D. steam motor bus, showing the location of the steering gear on the outside of the frame. The bus seats 29 persons in addition to the driver*

tric switch operated by a diaphragm communicating on one side with the steam space of the boiler and on the other connected directly to the switch. Rising boiler pressure acting on one side of the diaphragm causes the switch to open and stop the motor supplying air and fuel, while a heavy spring behind the diaphragm causes the switch to close when the boiler pressure falls. Opening and closing of the switch occur at predetermined points of boiler pressure which may be varied.

#### *Air Delivered by Blower*

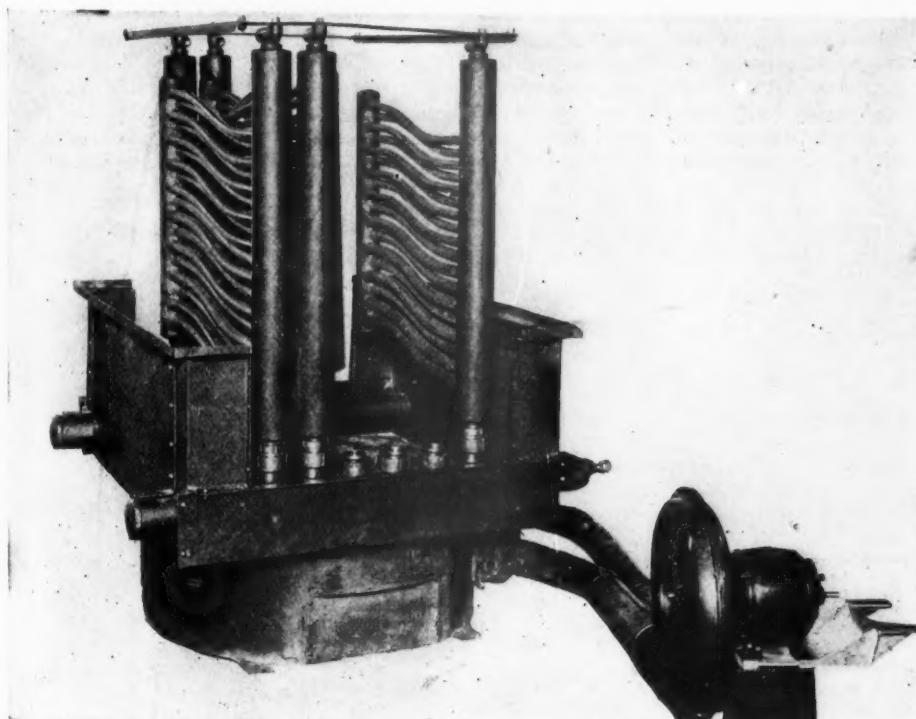
The air is delivered in a fixed amount by a motor driven blower which also drives the fuel pump. The only adjustment consists of the spring loaded bypass valve on the fuel line which by changing the tension of the spring allows more or less fuel to pass back to the main fuel tank.

The pilot light which is necessary in an on and off burner of this type operates continually. Fuel flows to the nozzle of the pilot burner by gravity and is there atomized by a jet of steam at a pressure of five lbs. per square inch. The pilot burner is mounted in the main duct of the on and off burner to insure proper ignition when the main burner is switched on by the falling boiler pressure. The pilot light is not required for starting when distillates just heavier than kerosene are used. All that is required to start the fire is a bit of burning waste and the immediate starting of the blower and fuel pump by closing the starting switch. With lower grade gas oils or light fuel oils, compressed air from any convenient source may be used for atomizing in the pilot light until the main burner ignites.

#### *Action of Pilot Burner*

The mounting of the pilot burner in the main jet just behind the jet from which the main fuel supply is admitted serves to help atomize the main fuel supply and to keep the main fuel jet moist and free from carbon deposit which otherwise might clog the orifice. The pilot light is larger than supplied in the past in order to provide a strong flame which cannot be extinguished by any blast of the on-coming main burner.

The water level in the boiler is maintained by a thermostatic tube slightly inclined from the horizontal to give a more gradual operation. As the water falls in



*A partial assembly view of the Winslow boiler used in the Q. E. D. steam motor bus. The boiler is made up of sections, each section being a complete boiler in itself*

the boiler steam enters the upper end of the tube causing the tube to heat up to the temperature of saturated steam at the boiler pressure. The resulting expansion of the tube acts to close a by-pass valve on the boiler feed pump, causing the water to be forced into the boiler. When the water level is sufficiently high the thermostatic tube becomes filled with water only a little warmer than the atmosphere and the resulting contraction of the tube opens the by-pass valve, allowing the water from the pump to follow the path of least resistance back to the water supply tank. This method of boiler feed water control has, of course, been in use for many years in stationary plant practice and on steam vehicles.

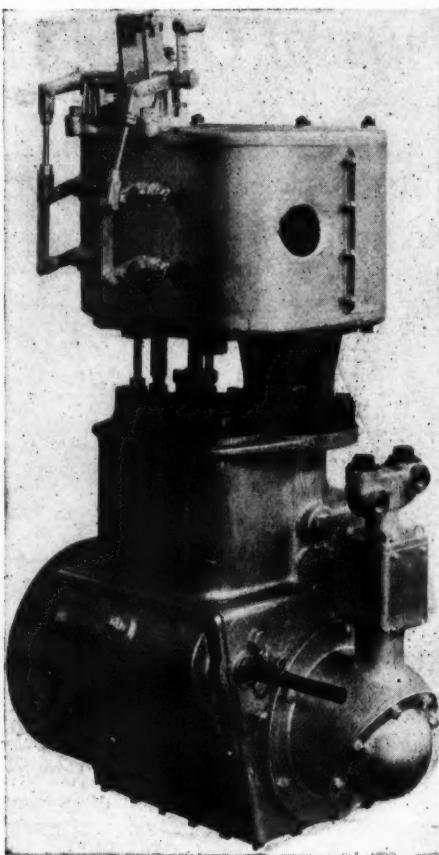
#### Feed Pump on Engines

The feed pump for supplying water to the boiler is a triplex, designed for high pressures and supplied with liberal stuffing boxes. The inlet and outlet valves are  $\frac{1}{2}$  in. balls made of Tobin bronze with limit stops on their lifts. The pump is mounted on the forward end of the engine and runs at  $\frac{1}{4}$  engine speed through  $1\frac{1}{4}$  in. gears. The exposed end of the feed pump crankshaft carries an overhung crank disc which drives a Detroit force-feed lubricator.

The engine is located directly behind the boiler and is constructed along conventional lines. It is of the compound type with a high pressure cylinder bore of 3 ins. and a low pressure cylinder of 7 ins. The stroke is 5 ins. A convenient pedal button controls the simpling device for admitting steam at boiler pressure to the low pressure cylinder and for passing the exhaust steam of the high pressure cylinder to the condenser.

The main engine valves are of the balanced piston type without rings and made of chilled cast iron ground to size. The steam admission may be changed from 85 per cent of the full piston stroke to 25 per cent, the latter point being the cutoff for normal loads. The valves are actuated through a Joy valve gear. A plain jaw clutch is used to disengage the engine for idling or for pumping as may be required.

The condenser is of the honeycomb type radiator made by the U. S. Cartridge Company with a frontal area of  $8\frac{1}{2}$  sq. ft. The draft through the condenser is pro-



*The compound engine used in the Q. E. D. steam motor bus. The high and low pressure cylinders are 3 and 7 in. bore, respectively. The stroke is 5 in.*

vided by a rotary outlet, shrouded, suction fan, made by the American Blower Company. This assembly of condenser and fan provides ample condensation it is stated, to enable the vehicle to travel from 120 to 150 miles on one filling of the 45 gallon water tank.

The frame is a deep channel section carried by semi-elliptic springs of the compound type with supplementary leaves which are brought into action as the bus settles with increased load. The rear axle is a Wisconsin made for bus service. The gear ratio is  $3\frac{8}{11}$  or  $4\frac{4}{9}$  to 1, as may be required. The propeller shaft is a Blood Bros. make with hardened bushings and pins running in oil.

The wheels have Mead cushion rims on which are mounted Firestone cushion tires. The steering wheel is a Ross set at a rake usually found in passenger car work. The gear has been placed on the outside of the frame with the trunnion shaft extending entirely across the frame with a drop arm and drag link on the opposite side.

Placing the steering gear on the outside of the hood covering the boiler naturally makes the gear accessible for any adjustments which may become necessary and incidentally leaves the boiler and surrounding mechanism free to be worked upon. Accessibility, in fact, of all the major units has been given careful attention to cut maintenance and service operations to the minimum.

#### Operating Cost Low

While bodies and other appointments will be made up to suit particular needs the one illustrated is built with a seating arrangement worked out for maximum comfort of 29 passengers and a driver. The seats spacing from center to center is  $29\frac{1}{2}$  inches which is quite liberal. The seats are made by the Haywood-Wakefield Company and have a deep coiled spring base, well padded and covered with imitation leather. The driver's comfort has been carefully considered. He sits quite high and well to one-side so that he may gage his clearance when passing other vehicles. His view of the road ahead and of the curb to the right is also good. The body is built of ash and aluminum. The height inside in the rear is 74 ins. and in front 77 ins. The width of the body is 90 ins. over all and the over all length from dash to rear is 261 ins.

The back of each seat is made with a recess on the level with the knees of the passengers, which provides an extra inch or so of room, an item often overlooked in the seating accommodations of motor buses.

On the basis of experimental operation the company claims that the fuel cost per mile is 2.2 cents and that the oil cost per thousand miles will not exceed 73 cents. It is also claimed that the cost of repairs and depreciation is very low for a vehicle of this size and type.



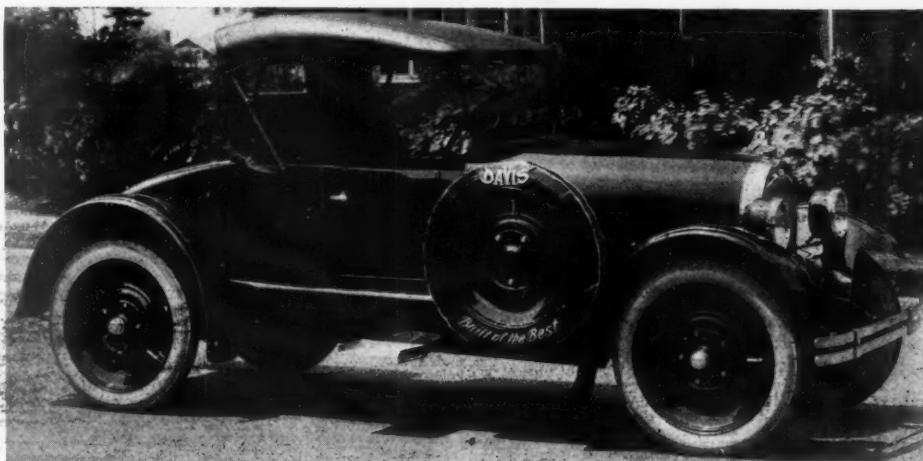
*The chassis of the Q. E. D. steam motor bus. This shows the relative position of the boiler, engine, etc. The blower fan will be noted just behind the radiator, the latter used as a condenser*

## Davis and Rickenbacker Present Roadsters

### Davis Announces Man O'War Roadster

A NEW sport roadster, the Man O'War, has been announced by the George W. Davis Motor Car Co., Richmond, Ind. This model, which has room for three passengers, is built on the Davis Series 71 light six chassis, and lists at \$1295, at the factory. Quantity shipments on the new Man O'War will begin within a short time, according to officials of the company.

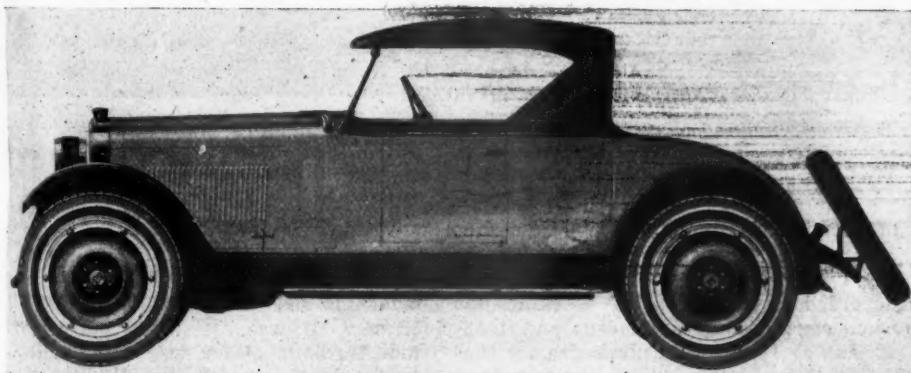
The Man O'War is finished in carmine, royal blue, or green with nickel plated radiator. It is upholstered in brown Spanish leather. Aluminum military steps and skirt fenders are standard, and it is equipped with a motometer, heavy nickel-plated double-bar spring bumper in front, drum headlights and extra Disteel wheel. In addition to the roomy luggage compartment under the rear



*Davis Man O'War Roadster*

deck, a locked compartment is provided in the interior of the car right back of the seat, for smaller parcels. It's wheelbase is 115 in.

### Rickenbacker Roadster Likely to Be in Production Soon



*Sample Rickenbacker Roadster*

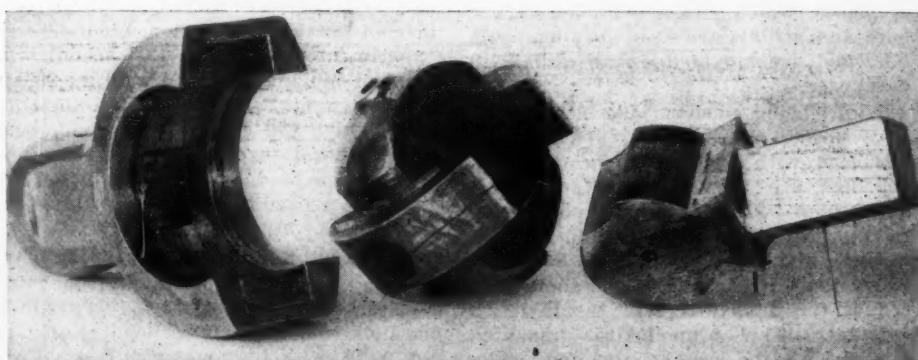
A sample roadster which will probably find its way into production in the very near future was shown by the Rickenbacker Motor Car Co., at Indianapolis during race week. The car is mounted on the standard chassis and is finished in dust-proof grey with a darker grey stripe in the form of a moulding which runs the entire length of the car. The upholstery is in the standard black leather and the car is equipped with a folding top. An added touch is given by bullet shaped lamps. The price has not as yet been set as it is very possible that there will be some additional modifications before it goes into production.

### Simplicity Features Holmes Universal Joint

THE Holmes universal joint is designed with three interlocking parts, comprising the entire assembly of the joint. The disassembled universal shows how it is fitted together. Taking each of the three parts from right to left it will be seen that the first right-hand part fits into the middle part, which in turn fits into the left-hand part.

This universal is constructed in two end-pieces and a center block. The terminal at the left of the illustration is the driven yoke, which receives the end of the car's driving shaft. The terminal at the right is the driving head, entering and engaging the rear of the power unit. These terminals are joined with the center block in a universal joint that permits operation under any pressure and against any shock to an extreme angle of 30 degs, it is claimed.

The two end terminals are drop-forged from alloy steel, machined and



*Disassembled view of the Holmes universal joint. Two end pieces and a center block comprise the assembly*

then heat-treated to raise further their torsional resistance.

The center block is a die-casting of manganese bronze. The die is cast within .002 in. limit between all meeting surfaces of terminals and center block.

This construction permits operation without an absolute necessity of lubrication, since only steel and bronze surfaces meet under pressure, though the universal is operated within a compact, greasetight housing.

# Performance of "Flivver" Airplane Indicates Possibility of Cheap Commercial Flying

*Less Than 10 Hp. Is Sufficient to Maintain Buoyancy and Forward Motion of This Little Ship Which Carries an Engine That Develops 16 Hp. Gas Consumption Approximately 30 Miles to the Gallon*

BY covering the 150 miles which separate Boulogne from Paris, in a single-seater Dewoitine plane consuming 5.2 gallons of gasoline, fuel costs for this flight were reduced to less than one cent per mile, and the possibility of cheap commercial flying appeared to have been brought a stage nearer.

The Boulogne-Paris flight was made by George Barbot on the day following his double crossing of the English Channel with the plane equipped with a 15 hp. engine of less than 70 cu. in. piston displacement. The flight from France to England and return was made with the object of winning a 25,000 franc prize, and might have been considered exceptional, whereas the flight to Paris was undertaken under normal conditions with no other object in view than to bring the machine to the capital by the cheapest means, to allow the authorities to check up the piston displacement.

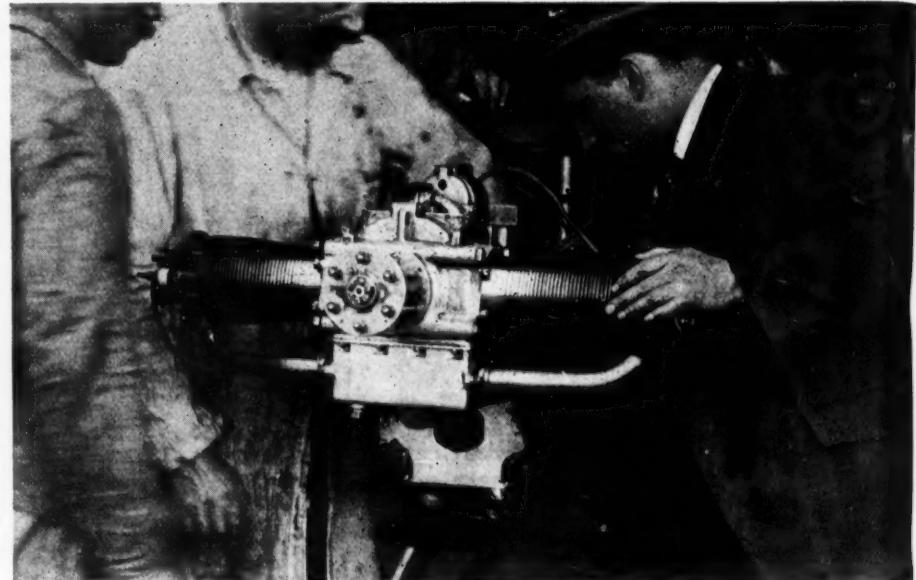
### *The Plane and Its Engine*

Barbot's machine is a Dewoitine monoplane glider, having an area of 193 sq. ft., wing spread 43 ft. 6 in., length 20 ft., height 47 in., weight empty 242 lbs., and weight in full flying order, with pilot aboard, 507 lbs.

The engine is a twin cylinder air-cooled Clerget which was not specially designed, but was fitted for the cross-Channel flight in view of the rule calling for all parts of the machine to be of French construction. This engine was brought out a couple of years ago by half a dozen were built, and the one used by Barbot had previously done service on a small automobile. The two cylinders, which measure 3.3 by 3.9 ins. bore and stroke, are steel forgings with fins, and are mounted on an aluminum crankcase.

While being modern, the design follows normal lines. The valves are in the head with push rod operation, ball bearings are used for the crankshaft and roller bearings for the connecting rods. The intake manifold passes through the base chamber in order to warm the mixture and at the same time reduce the temperature of the lubricating oil. The propeller is mounted directly on the crankshaft, and while the maximum speed of 1,600 r.p.m. will develop 16 hp., the flights are practically all made with 10 to 11 hp.

While a lot of attention has been paid to glider flights during the past few weeks, these performances were far from arousing complete approval. Many looked upon engineless flights as a fascinating but dangerous sport, while the others saw in them the beginning



*This two-cylinder engine is the product of a firm that supplied the well-known Clerget rotary engines to the Royal Air Forces. Anti-friction bearings throughout and the use of machined steel cylinders are the features of construction*

of economical commercial aviation. But since Barbot flew the Channel and made his 150 mile flight to Paris the status accorded to this type of machine has been considerably enhanced, and technicians are showing a much greater tendency to treat them seriously than was the case a few months ago.

That there is a direct relationship between the recent flights made by gliders and commercial and military aviation is shown by experience at Biskra, in Algeria. Before the gliders arrived on the ground for the competition, Lieut. Thoret experimented with a normal school type Hanriot biplane equipped with an 80 hp. Rhone engine. Flying above the hill from which the gliders were to be sent away, Thoret throttled down his engine and endeavored to obtain sustension from the ascending currents striking the flank of the hill.

He found that instead of flying nose to the wind, tail down, the machine should be kept in normal flying position, parallel to the hills, perpendicularly to the wind, with its nose slightly to windward. It was under these conditions that he was enabled to remain in the air, flying backwards and forwards along the line of hills, with his engine shut off, for 7 hrs. 3 min., thus creating a world's record.

When the glider pilots arrived, Thoret took them in his Hanriot machine in order to make them acquainted with the prevailing air currents and to show how

advantage could be taken of them to remain aloft. It was as the result of this that Barbot, on the Dewoitine glider, made his record flight of 8 hrs. 36 min. 55 sec. It was after this performance that Barbot's glider was fitted with an engine to be used for getting it off the ground and to sustain it in the air when favorable rising currents were not available, and to enable it to win the prize for a cross-Channel return flight with an engine of less than 91 cu. in.

### *Commercial Value of Experiments*

Among the practical conclusions to be drawn from these experiments is the possibility of all commercial planes, whatever their nature, running with 20 to 50 per cent fuel economy over certain sections of their route. Given such conditions as pertained at Biskra, in Algeria, the London-Paris planes could fly with engines shut down at more than 60 miles an hour for distances of several hundred miles, without any loss of safety.

These low powered gliders with flexible wings of the Dewoitine type, have shown themselves capable of remaining aloft under rough weather conditions, and thus open up the possibility of touring planes cheap to purchase and maintain, and independent of organized landing grounds because of their ability to come to a stop within a distance of about 50 feet.

# Competition You Must Expect in Tires and Some Suggestions

*Service for the Car Owner and Quality Talk Are the Weapons. Associations Have Considerable Part in Changing Conditions.*

By CLYDE JENNINGS

Fifth Article

EVERY man who goes into the tire selling business should do so with the full understanding of the competition that he is going to meet. He will have plenty of it and it will be of all kinds.

Some of this competition will be of the fairest possible kind and will come from high class merchants who are endeavoring to promote their business by the most approved methods and at the same time make a profit on their merchandise.

The competition will range from the above standard down to the most disreputable competition that any merchant ever faced. This competition will reach the levels of the fire sale clothing or drygoods house, which has long been known as the worst sort of competition.

The climax of bad tire competition has come with the temporary store. The store that some city "gyp" sets up in a vacant room with a lot of seconds or unknown brand tires and upsets the local market while he is there. Of course this man, like the wandering clothing merchant, moves on before even the poor tires that he sells have an opportunity to come back to him.

It is not improbable that such a merchant may purposely damage one or two of the first tires that he sells so that they may collapse and he will have an opportunity to replace them as early as possible. This is done to make the bargain hunting public think that he is reliable and will make good on his merchandise.

Such a replacement will sell a lot of tires that may supply one-third of the regular mileage for something near the regular price. A tire is a fairly high priced article and a discount of 20 per cent often means quite a bit in the price the customer pays.

Then there is the mail order house. The writer recently asked three tire dealers who had reported that mail order tires were their strongest competition, what mail order firms were the strongest competitors. The result of these questions are of more than curious interest. In substance they were as follows:

The first one did not know what firms sold the tires, he rather evaded the question by saying all mail order firms. He did not know what prices these mail order tires sold for. He was very vague on details and apparently accepted for himself the answer "mail order" as being entirely sufficient. It was a stonewall for him and he was not trying to see over it.

The second dealer knew the name of a national mail order house that sold the most tires in his community, also the name of the tire, but he did not know the price on any size. He did not even know that they sold two qualities of tubes.

## Third Dealer Knew His Competitor

The third dealer quickly supplied the name of the mail order house that was his chief competitor, and he also knew the prices made on the two popular sizes of tires both fabrics and cords and he knew the prices and qualities of the tubes this firm sold. He knew the terms of the guarantee this firm gave and he asked every driver who brought these tires to his place what service he was getting out of them. He did not fool himself by remembering only those who had unsatisfactory results, but he kept in mind those who were pleased with their purchases.

His verdict was that this mail order tire service was pretty

good and that he had to get real selling talk to meet it. This man has an air tube for use of the public and makes it a point to attach this tube as often as he can for the person who drives up for air. Then he talks to them about tires and he is pretty well informed on the general subject. He draws no distinction when he goes to the air tube to give service and he finds that his failure to discriminate or to disparage the mail order tire is winning for him. He is making service and his personal effort in case of an adjustment his winning card.

One cannot feel very sorry for the man who does not know what his competition consists of. The man who dismissed the inquiry merely by answering "mail order" conducts a repair shop and the equipment for the shop is more prominently before the customer than his tires for sale. Incidentally, he complained that there was not much money in tire repairing, yet he gave up his best space for this display.

## Some Complaint of "Worst Competition"

In discussing competition with many tire men (not by any means all of them) you get the idea that they think that they have the worst competition in the business. It is a bit strange to hear this, because when you visit the clothing merchant and others of his kind you hear the same complaint. In fact, the clothing merchant knows full well that he has the worst competition that ever existed. In fact, he will tell you so at any time and when you hear him tell how recently it was that the "one price" clothing house was a rare institution, you are inclined to believe in him despite the number of tire dealers that you have sympathized.

There is one thing certain, in the consideration of this competition, that the clothing merchant has it on his tire brother in the number of meaningless brands of clothing that are offered for sale. Also the private brands that mean less than nothing. The big tire business of today is based on brands and it is the duty of every tire dealer in the country to talk brands and what they mean.

Store up for your sales argument the stories you get at first hand of the car owner who has bought from a gyp merchant or a gyp mail order house a tire that carried some strange brand, and tell the hesitating customer about it.

Tell this hesitating customer that it is the wildest sort of folly to buy a tire that he does not know about. Tell him about the company that makes the tires you sell, where it is located, how long it has been in business, what the capital stock is, what it means to this company to have repeat customers, which the company can have only when service is delivered to the car owner and adjustments are made.

Really, now, how many of the tire dealers who read this article can make a talk about the company that supplies the merchandise they sell? How many of the dealers have seen fit to drill their salesmen in this information?

If you are going to sell Balloon tires, know all about the Balloon company and sell it just as hard as you sell the tires. The tire is not a bit better or worse than the company that makes it. You must sell the tire and the company at the same time.

This is not an argument that you must sell a tire made by a big company which has a long list of ciphers in the capital stock and surplus accounts, but it is an argument that you must sell tires made by a reputable company. A lot of the small companies have a perfectly honorable history. Just as there are many small merchants who are just as reliable as

the big department stores, and the customers who live on a moderate income, who are as honest and as reliable as the most wealthy of your customers.

It is character, business character—that you are selling and see to it that the company that supplies you with these tires also supplies you with facts that go to show its character and its ambitions. We know some perfectly reputable tire manufacturers that have not the slightest ambition to make the "big seven," but they are ambitious to retain a place on the list of those who make and sell good tires,—tires that supply good service in transportation and on which adjustments are made on a friendly square basis.

### Mail Order Houses Could Complain

It would be interesting to know why some tire merchants accepted the responsibility of selling some of the tires that they handle. The tires are not listed in reputable lists, the manufacturers of these tires are not included in the membership of tire manufacturer associations. The firms are not listed as good risks in commercial agency lists. In fact, there are tires being sold in the country that are little short of a conspiracy to defraud, and yet the men who are selling these tires pretend that they think they are reputable merchants and they complain of mail order competition.

It would seem that the responsible mail order houses have cause to complain about the competition that they meet in some of the smaller cities.

The answer to this competition question is:  
Education of the tire dealer.

Service to the tire customer and the proper organization of the tire dealers in various localities.

Take these points in the order named.

The point as to education has been terribly neglected. Few dealers apparently have had at hand the material with which to educate themselves. I asked a very live dealer the other day what literature he read to keep posted about tires and the automotive trade. I asked him who had made recommendations that he read anything to keep posted. This man had been in automotive lines for five years, all of that time he had sold tires and recently he had taken up accessories and was pleased with his success. Recently he had been

induced to subscribe for an automotive paper and was quite pleased with it.

But he said that until recently no one had suggested to him the advisability of reading anything. He had always read everything that came to him from the factories he sold goods for, and he knew what he read. He said that he wanted information about other tire factories, but the mail that he received did not bring him the kind of information that he wanted. For some reason he had not been on mailing lists until just recently.

The point I got out of this was that this man, a progressive by nature and above the ordinary intelligence, had never been advised by the companies he represented as to how he could get the information that he craved. The factory, branch and salesman had all overlooked the possibilities in this man.

The education, as we see it, should not only be along the lines of tire information but along the lines of better merchandising and service. In Paris, Ill., there is a man who says he is in the gas and oil business and that he sells a few tires. Pressed a bit further, he said that he sold 400 tires last year, and not nearly all of them were Ford sizes.

This man's oil station was on the main tourist highway through the town. He got the "ask'em to buy" idea by a process of reasoning and so he hired a boy to help him at the pumps. Then when either he or the boy had a moment to spare from waiting on trade, they watched the cars arriving. If the car had a flat tire, one or the other of them would take a tool or two in their hands and go to the car and offer assistance. Their time, tools and the air pump were at the service of the unfortunate car owner.

The result was the sale of the 400 tires and many tubes. It was a very profitable business venture on the part of the merchant.

Last year the tourists were coming into the town on a detour and this gas merchant was on this detour. During the winter, the main driveway was completed and the value of the detour location went down about 75 per cent. So this merchant got a location on the main highway and is all set for another year of "ask 'em to buy" tires.

This man is a real merchant and along with his gas, oil and tire business, he is adding a few accessories and some day he

## This Is the Price Display of the Competitor Most Often Spoken of and Most Heartily Feared

### Prices

#### JUSTICE FABRIC Tires

##### Ribbed Tread.

Catalog No.	Tire Size, Inches	Shipping Weight, Lbs.	Price
28L3304 1/4	28x3	8 1/2	\$ 5.85
28L3305 1/4	30x3	9 1/2	\$ 5.95
28L3312 1/4	30x3 1/2	12 1/2	\$ 6.95
28L3314 1/4	32x3 1/2	14 1/2	\$ 9.39
28L3321 1/4	31x4	15 1/2	\$ 10.45
28L3321 1/2	32x4	18 1/2	\$ 11.95
28L3322 1/2	33x4	19	\$ 12.25
28L3323 1/2	34x4	19 1/2	\$ 12.95
28L3323 1/4	34x4 1/2	26	\$ 17.95
28L3333 1/4	35x4 1/2	27 1/2	\$ 18.25

\*Clincher style only. All other sizes furnished in straight side style only.

##### Anti-Skid Tread.

Catalog No.	Tire Size, Inches	Shipping Weight, Lbs.	Price
28L3404 1/4	28x3	8 1/2	\$ 5.85
28L3405 1/4	30x3	9 1/2	\$ 5.95
28L3412 1/4	30x3 1/2	12 1/2	\$ 6.95
28L3414 1/4	31x4	14 1/2	\$ 9.95
28L3420 1/4	32x3 1/2	15 1/2	\$ 10.45
28L3420 1/2	31x4	15 1/2	\$ 10.45
28L3421 1/2	32x4	19	\$ 11.95
28L3422 1/2	33x4	19 1/2	\$ 12.25
28L3423 1/2	34x4	20	\$ 12.95
28L3431 1/2	35x4	21 1/2	\$ 14.95
28L3431 1/4	33x4 1/2	25 1/2	\$ 17.95
28L3432 1/4	34x4 1/2	26	\$ 17.95
28L3433 1/4	35x4 1/2	27 1/2	\$ 18.25
28L3434 1/4	36x4 1/2	28 1/2	\$ 18.75
28L3441 1/4	35x5	33	\$ 18.95

\*Clincher style only. All other sizes furnished in straight side style only.

\*\*Use on 30x3 1/2-inch clincher rims.

### Special JUSTICE MAMMOTH Tire.

A splendid fabric tire in clincher anti-skid style on a size 30x3 1/2-inch rim to 30x3 1/2-inch clincher rims. Their tires taken your Ford, Clegg, Briscoe, Dort, Maxwell, Overland cars etc., out of the small car class in appearance, gives you easier riding and reduces your tire cost per mile. Shipping weight, 15 pounds.

AL1018—Special JUSTICE MAMMOTH Tire. \$8.95

We guarantee JUSTICE FABRIC Tires against defects in material or workmanship on the basis of 6,000 miles' service. We will repair or replace a DEFECTIVE casing on the above basis, charging only for the mileage received from the tire.

We guarantee JUSTICE CORD Tires against defects in material or workmanship on the basis of 10,000 miles' service. We will repair or replace a DEFECTIVE casing on the above basis, charging only for the mileage received from the tire.

NOTE—We can only furnish JUSTICE FABRIC and CORD Tires in the sizes and styles listed.

JUSTICE Tires can be shipped by parcel post. Tire shipments can be made up to 70-pound packages in local zone and zones 1, 2 and 3, and up to 50-pound packages in all other zones.

### Prices

#### JUSTICE OVERSIZE CORDS

FURNISHED IN STRAIGHT SIDE STYLE ONLY.  
EXCEPT 30x3 1/2-INCH SIZE.

##### Ribbed Tread.

Catalog No.	Tire Size, Inches	Shipping Weight, Lbs.	Price
28L3912 1/4	30x3 1/2	16	\$ 6.45
28L3914 1/4	32x3 1/2	21	15.45
28L3921 1/4	32x4	25	17.25
28L3922 1/4	33x4	26	17.75
28L3923 1/4	34x4	26	18.95
28L3924 1/4	34x4 1/2	30	23.95
28L3932 1/4	35x4 1/2	32	24.95
28L3941 1/4	35x5	41 1/2	29.95

\*Clincher style only.

##### Anti-Skid Tread.

Catalog No.	Tire Size, Inches	Shipping Weight, Lbs.	Price
28L4012 1/4	30x3 1/2	16	\$ 9.95
28L4010 1/4	30x3 1/2	16	110.95
28L4014 1/4	32x3 1/2	21	15.45
28L4020 1/4	31x4	22	16.75
28L4022 1/4	32x4	25	17.25
28L4023 1/4	33x4	26	17.75
28L4023 1/2	34x4	26	18.95
28L4030 1/4	32x3 1/2	27 1/2	22.45
28L4031 1/4	33x3 1/2	28	22.95
28L4032 1/4	34x3 1/2	30	23.95
28L4033 1/4	35x3 1/2	32	24.95
28L4034 1/4	36x3 1/2	33 1/2	25.95
28L4039 1/4	33x5	35	26.95
28L4041 1/4	35x5	41 1/2	29.95
28L4043 1/4	37x5	42	31.45

\*Clincher style only.

†New 30x3 1/2-inch straight side style.

These prices are not such drastic cuts, especially if the dealer will consider that parcel post prices from Chicago must be added. There is no reason why this competition cannot be met by service and home trade arguments. It is a perfectly safe bet that in 50 per cent of the larger communities in this country some dealers are actually underselling this long distance competitor.

Size	List Price	Sale Price
30x3½	\$16.95	\$ 9.90
31x4	21.25	15.95
32x4	36.10	22.41
33x4	37.20	23.41
34x4	38.15	22.95

*The above is not a mail order advertisement, but an advertisement for standard brand tire that has appeared in the Chicago newspapers frequently. There are some worse forms of competition than the dreaded mail order catalogue*

is going to sell cars, and when he does go into the car selling business, he is going to run a Transportation Store and keep the cash register ringing with profitable sales.

#### Not Worrying About Competition

This man is not worrying about competition. He is selling tires when he can get a price that makes him a profit, and he says that his price to tourists is the same as that to home folks.

Such examples as this are the sort of education that tire merchants need and they should get a lot of it. Much of this lack of education reflects back to the factory salesman and also to the local distributor. How absurd it is to establish a tire dealer and let him keep his old tub in which he tests tubes at the front door and to use the show window space as a storage place for junk. The factory that establishes such a dealer has acquired a liability instead of an asset. Some factories have a lot of such liabilities and these explain why their tires are not popular in communities where the map shows plenty of dealers.

In Jefferson County, Ill., for instance, a tire that is backed by an extremely high class and dignified campaign, one that fairly exudes quality, is sold only by an iceman. This dealer may be a good iceman, but there is little doubt as to where he is classed as a tireman. He says that he took the dealership in this tire because he liked the tires for his trucks and he found he could buy them cheaper by taking the dealership. So he took it and this particular tire becomes a gyp tire in that community. It is a distinct liability to the manufacturer.

In speaking of education of tire dealers it must be kept in mind that many excellent tire dealers of today have started in the technical side of the business and have educated themselves sufficiently to become real merchants, but another lot of these technical men are still technical men and always will be unless there is a distinct and forceful effort to educate them in merchandising.

As a matter of fact men go into business to make money and the education of dealers should be based always on the possibility of profit. Very few men are in business either for their health or for glory. They want to support themselves, their families and to leave a business for their children. It is on this platform that their education must be effected. In the case of the iceman who has taken on a side line of tires (mentioned two paragraphs previous) he should not be considered in the tire business at all. He is violating every principal of the mercantile business. He has taken on a line of merchandise to save money, not to make money.

But if tire manufacturers will remember that merchants are in business to make money and constantly hold before them the goal of a happy comfortable home, college for the boys and girls, a comfortable income for the widow, a going business for the boys and make that the basis of arguments against cut prices, senseless competition they will get some place.

Instead most of the literature that goes to dealers is dribble. The dealers, apparently, are not considered to know any more than the general public about tires.

The question of dealer advertising to support national advertising is of such great educational importance, that we will leave that for another story.

*The first four articles of this series were published as follows:*

*May 24—Now Is the Time to Add Tires to Your Transportation Store.*

*May 31—Tire Sales Not "Small Change," Totals Run Large.*

*June 7—What Tire Makers Are Doing to Make Tire Selling a Better Business.*

*June 14—Some Things the Tire Manufacturer Can Do to Improve Tire Merchandising.*

Now for a short session on service to the customer.

Just a few days ago a man with an out of the state license drew up on the mainstreet of a small town and began to work with a flat tire. In the door of a tire shop a few doors down the street stood a man who looked like the tire mechanic and smilingly watched the performance. After a few minutes work the car owner apparently concluded that he needed something to assist in the operation he was undertaking. He looked up and down the street, made a bee line for a hardware store. Disappeared for a few moments, came back and finished the job.

Out of curiosity the writer went to the tire shop, stepped past the man in the door and looked around. After an instant wait, the man in the door turned and inquired "What can I do for you?"

#### Service to the Customer

Honest, it was the tire man who was smilingly watching the car owner change the tire.

This man had tires for sale, but trade was not very good. Too much competition. And, eventually, we found that the people of that community were not good buyers and some of them would not even have their tires repaired.

This does not sound much like the Paris man who sold 400 tires from an oil station, does it?

In Chicago a woman drove into an oil and gas station with a flat tire. She did not know it. Trade was not very brisk, the gas pump operator changed the tire for her, saw to it that all her tires were properly filled and declined pay. He explained "We like to do that for our gas customers when we have time. The tire people around here do not give much help unless you buy new tires. We figure that women should not be forced to get out and change tires."

Of course the man got a tip, but he did not act as if he expected it but he did make this woman car owner think over the tire stores she had visited and she could recall but one where the treatment accorded her had seemed entirely wholesome.

Contrast this with Roadstrom's place in Peoria, where there is always an attendant on the curb at the air pump, always ready to see that any car that draws up leaves with all tires properly inflated and that any nails or other dangerous materials are drawn from the tires and the driver warned if any tire is giving evidence of weakness. This is a regular service and it has become a custom with many Peoria people to drive around by this store before leaving for a long drive to insure the tires lasting for the drive.

Is it any wonder that this store is building a rapidly growing accessory business along with a steadily increasing tire business.

The objection has been raised to the automobile dealer selling tires that his salesmen do not know enough about tires; that he is likely to use them as langinappe and similar objections of that sort.

We believe that these objectors do not understand the automobile dealer well. Today the up and going automobile dealer is not giving anything away that he can charge for; he needs the money. We do believe that the real automobile dealer has a better idea of service that is due a customer than the average tire dealer.

Of course he has more to gain by giving service, because he has more behind his sales prospect than tires. It is for that very reason that we believe that the automobile dealer is the man to sell tires.

**It is largely a matter of education as to what service the dealer will give and after considerable experience with various sorts of dealers we cannot refrain from expressing the opinion that it would be an easier task to educate the automobile dealer to the advertising and sales possibility of service than the tire dealer of today.**

### Now What About Organization?

The National Tire Dealers Association has awakened to the possibilities and seems set for some very good work. The officers have undertaken a big job but they are making progress. There is a big work ahead of them as the tire business needs many changes and these can best be made when the dealers and manufacturers agree on what changes shall be made and how. It will do little good for the manufacturers to take an arbitrary stand, as the dealer turnover will then offset much of the good that will come out of the change of methods.

It would be just as bad for the tire dealers to meet and pass a lot of resolutions about changing the business and then live up to them in defiance of the manufacturers.

**The way to do this thing is for the associations to work toward a common understanding and then educate a majority of the dealers and manufacturers to this standard. As we understand it, that is what is going on.**

But the National Tire Dealers' Association in its fondest dreams of trade betterment cannot hope to cope with all of the local situations. There must be local associations, if for no other purpose than to get the various tire dealers acquainted. Under present circumstances we cannot see any hope of local organizations that will be 100 per cent. Just think of what might happen if all of the Jefferson County, Ill., dealers should attempt to fraternize. This is the party that would meet:

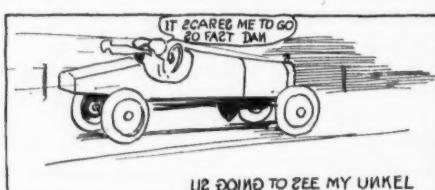
Exclusive Tire Store.....	1
Accessory stores .....	2
Car Agencies .....	7
Garages .....	9
Vulcanizing Station .....	1
Hardware stores .....	3
Grocery & Restaurant .....	1
Lumber Co. .....	1
Ice, Coal & Livery .....	1
Drygoods .....	1

The idea we have in mind is the local dealers' association to organize a tire group or at least have a table at the monthly meeting where the tire specialists can eat and talk and hear the proceedings. It is the automotive spirit that the tire dealers need most of all. They must have it and they can get it only by association with automotive men. The iceman and the restaurant man can be eliminated.

There has been a spirit among certain tire men of all degrees

### DAW'Z DIARY

JUNE 11—I gess me and Art is out of luck becuz the boss aint said nothin about them days off and as long as we got as much work as we have now we might as well keep still. Anyhow we can still work it like i done last week when i sais say boss i gotta get of tomorrow i gotta go over to Jonesville to see my unckel him being sick. You got more sick relatives than any fellow i ever seen sais he its a good thing none of them nashional baseball games is around here or theyd halfto start a new semetary. Can't you do it in a  $\frac{1}{2}$  day or go in the evening if you get of early. I halfto be there by noon i sais me not halfin to be



there any morein a rabbit but tryin to make it sound O. K. Well you come and work hard til 10 o'clock and then go sais he and so i done that, and Art let me take his speedster and i got my girl and we sure had a swell time her puttin up a swell lunch for us and us eating it besides a little crick which i know about. Certainly does a guy good to get away from the grees sometimes.

that they were not a part of the automotive business. This was born of a waste of competition at shows. Some silly advertising men carried show exhibits to an extreme that it was found necessary for the tire men to cut out shows altogether. Then some of the tire men, from makers down to dealers, got it into their heads that they were not a part of the automotive industry. They would go it alone.

Well, if they carry that far enough the car manufacturers may decide not to use tires on their cars at all and then what will become of the great lonesome industry. Tires and automobiles belong together and they must rise and fall together and the tire men should go into the small shows, if not the large ones.

Down at Quincy, Ill., there was organized a tire bureau of the Automotive Dealers' Association. These men ate and talked together and in a very short time they discovered that some manufacturers gave bigger discounts to some dealers than to others.

They also found that some branches sold to wealthy men at wholesale and similar offenses against good merchandising. That first year was a lively one and there was a considerable turnover in dealerships. Some quite prominent manufacturers were left without retail outlets in that territory but what was more to the point, the dealers got to understand each other.

### Tire Market Improved

The tire market improved, so did the service for the customer. These things are worth while. If a manufacturers' policy will not stand discussion among dealers, it is time that manufacturer was dropped by his dealers. It has been said that some manufacturers are opposed to tire dealer associations and it is quite evident from the Quincy experience why they are opposed. Most manufacturers, however, will favor local organizations for the better manufacturers realize that a factory without prosperous contented dealers, cannot be prosperous for any great length of time. Certainly the stockholders cannot be content.

The social side of a trade association is a great educator for the average dealer. After a dealer breaks bread with his competitor, he soon gets on such terms with him that he can call him up and prove that the customer who is quoting such low prices is a liar. There are more good buyers in this country than there are good salesmen. When the dealers get that idea firmly lodged in their minds, they will be better equipped to meet these buyers.

**Just one more thought. If there is a very low priced tire being sold in your community, get one of them (new or old, according to the state of your pocketbook) cut it in two so that you can show the next man who quotes you prices on that tire just how many layers of fabric or cord is used in its makeup. Never forget that the strength of the tire is not in the thickness, it is in the solidity and number of properly made plies.**

Art is going to pull one something like that this week and me again nex week us figuring that if we can get that old burd to know that the world wont come to an end with one of us gone maybe we can get regular days of later.

Art is the slickest fellow i ever new and the naturalist born mechanick that ever lived i havent seen him get stumped yet and the way he can make them electric currents follow him around and eat out of his hand is great. He sais he lurned about them in high school studying fizicks. Me saying i thought that was what you took when you was sick but him sayin no that was a nother kind. I wish i had of gone to high school stead of being so crazy to go to work and now wanting to get out of it.

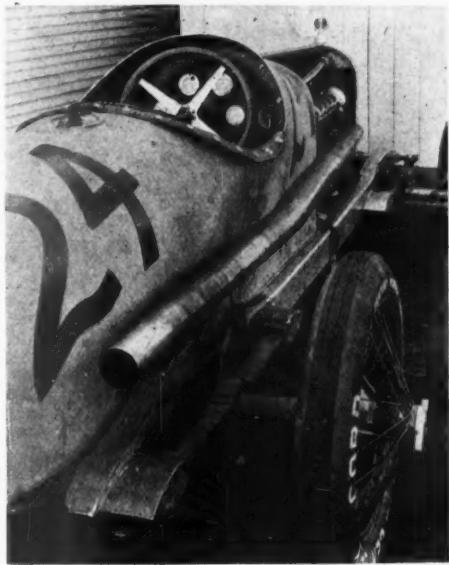
# Duesenberg Will Race at Kansas City

*Some Details of Construction of Cars, Only One of Which Was Completed for Indianapolis Event*

THREE items feature the construction of the 122 inch eight cylinder Duesenberg race car which was completed barely in time to enter the last Indianapolis race. They are the frame construction, the fuel system, and the spring shackling.

The frame, which has been mentioned in these columns previously, is made of Duraluminum one-eighth of an inch thick. The side rails are hand formed and each rail is made in two pieces. The outside section is similar in outline to the conventional steel side rails but is reinforced by a second member of similar shape but just enough smaller to be a light press fit into the outside member. Each side rail complete is a side rail within a side rail but instead of the inner member bottoming into the outer piece it is pressed into it out half its full depth and a laminated wood filler is inserted between the two. The inner member is held firmly in place by rivets through the upper and lower flanges. There are four cross members, all of which are built up from sheet steel of about eight gauge thickness. The rear cross member, the end of which is visible between the body and the end of the frame at the rear, is of hollow box section with a laminated wood strip for a filler. The cross member ahead of this is also of built up hand formed construction and supports the torque tube yoke and transmits the propulsion effort to the frame. The frame complete with spring fittings weighs 1/3 less than a steel frame of the same dimensions with only two cross members.

Bolted to the frame side rails are the rubber spring anchorages which are called "shock insulators." With this method of shackling the spring ends are



*The effort towards low unsprung weight is apparent in the spring shackling and method of fastening to the rear axle. The streamline housings carry the rubber shock insulators. The center bolt is eliminated and the spring is arched to conform to the axle housing to which is held by two "U" bolts*

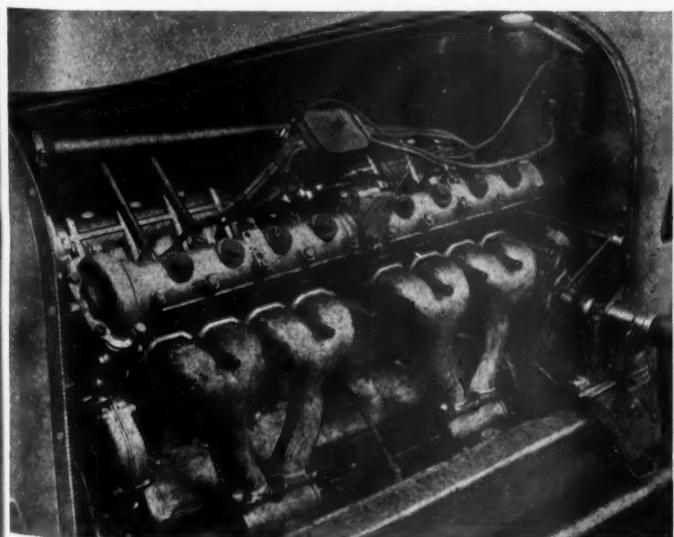
plain without bushings or eyes. The ends are held between what might be termed a rubber bumper top and bottom which allows a slight end movement of the spring. These rubber bumper elements are in turn mounted in a two piece aluminum housing which when assembled compresses the upper and lower bumper against the top and bottom of the spring end. This method of spring anchoring is similar in design to the method used on some models of the Mack International bus chassis. The effort of

the designer to reduce the unsprung weight of the chassis is apparent by a glance at the rear spring fastening at the rear axle. The conventional saddle is eliminated and also the center bolt, the spring plates being formed at the center in a semi circle to conform to the axle housing contour.

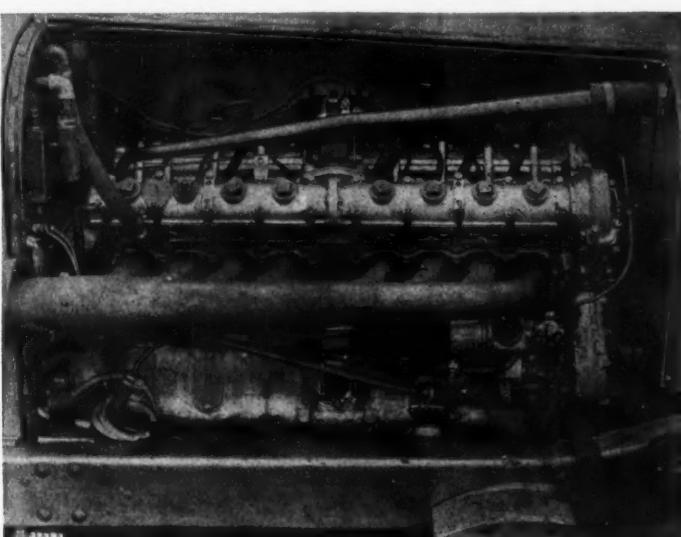
The third feature of the chassis is the fuel system which makes use of a pistonless pump which circulates the fuel itself instead of using air pressure. With this system the tanks are at atmospheric pressure and the filler caps are fitted with an air vent. The pump unit is mounted on the right side of the engine and is part of the assembly of water and oil pump which are combined in a very compact manner. The fuel pump is the top unit is visible in the illustration of the exhaust side of the engine, being located just below the exhaust header branches from the two front cylinders. The mechanism of the pump consists of a Sylphon hollow spiral coil such as is commonly used for water temperature regulation thermostats. A connecting rod driven from a small eccentric shaft is connected to a diaphragm which alternately compresses and lengthens the Sylphon unit.

Provision is made to regulate the length of the stroke which varies the pressure on the fuel in the feed line.

Other details of the chassis are the cam type steering gear of Ross make, the lower end of which is mounted on the left side of the frame between the side members. Center location of the steering wheel in the cockpit is accomplished by installing a Climax fabric universal on the post shaft between the wheel and cam housing. The steering pitman shaft is supported near its outer end by a



*The two camshafts are held by studs to the head which is also detachable. The crankcase upper and lower are part of the aluminum block casting. For the removal of the inlet manifolds wrench clearance is allowed by bushings over the long studs*



*The oil pump, gas pump and water pump are contained in a compact assembly just behind the timing gear case. The small tank fastened to the dash feeds oil by gravity to replace any lost by leakage in the hydraulic brake mechanism*

sheet steel light weight bracket anchored to the left frame rail.

The rear axle is built up from nickel steel tubes for the shaft housings and an aluminum alloy differential housing. Like the axle of the Miller engined cars the differential housing is not provided with an inspection plate, it being the purpose of the designer to obtain maximum rigidity with least weight.

Ball bearings are used throughout the axle and a Climax fabric universal is fitted to the front end of the driveshaft which is enclosed in a torque tube. As previously mentioned propulsion is taken by a frame cross member to which is anchored the yoke mounting of the torque tube. The pinion and ring gear are straight cut bevels and the ratio is just slightly over 4 to 1.

Brakes are fitted to the rear wheels and transmission; the former are internal expanding actuated by the foot pedal which is the piston of the hydraulic mechanism. The transmission brake is connected to the hand lever and this brake which is external contracting is not hydraulically applied.

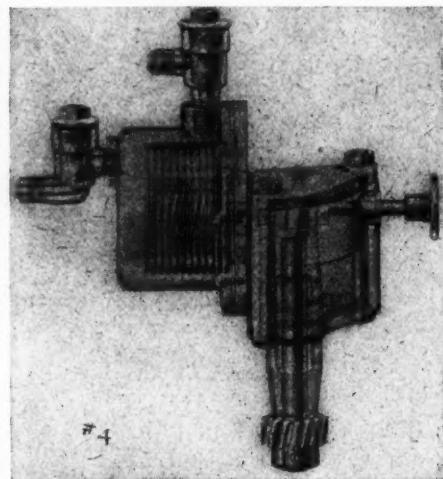
The transmission has three forward speeds and a special Duesenberg automatic auxiliary shifter for disengaging the countershaft when running in high gear. Ball bearings are used throughout and all gears are carefully balanced before installation.

The engine block casting is of aluminum alloy and forms the upper part of the crankcase. Case hardened individual sleeves are inserted which gives the engine a bore of  $2\frac{1}{8}$  inches. The stroke is  $3\frac{27}{64}$  inches. These individual sleeves have a flange on top which fits into a milled out depression running the full length of the cylinder block.

The depression is of the same depth as the thickness of the flange on the sleeves and when all sleeves are inserted the top of the block is level clear across. Fillister head machine screws through the flange of each sleeve serve to hold the sleeves from turning and the detachable head holds them seated. The seal at the lower portion of the sleeves is made by

an annular composition gasket which is installed in a groove in the block. This gasket surrounds the outside diameter of the sleeve, the construction being similar to that used on the G. M. C. truck engine.

Tubular connecting rods of very thin



*Siphon gas pump used instead of air pressure on the Duesenberg engine. This unit can be seen mounted to the oil pump assembly just below the exhaust manifold. The four pipe lines are the inlet and outlet from the force and scavenger oil pumps in the same assembly*

wall are lined with babbitt at the big end and are equipped with a bronze bushing at the small end. The pistons are of Bunite alloy and carry three rings. The two upper rings are  $3/32$  of an inch wide and the lower oil control ring is  $1/8$  inch wide. A groove about  $1/16$  of an inch deep and half an inch wide is cut all around the piston in a line with the piston bosses. A spring steel flat ring fits into this groove and retains the piston pin which floats in rod and piston. The crankshaft on the engine which entered the race was carried on three bearings although some experimental work was done with a view of using five roller bearings. The three bearing shaft has a ball bearing at either end and a plain

bearing at the center. Two camshafts are fitted each of which is carried in six bearings. Four of these bearings, No. 1, 3, 4, and 6, are annular ball and No. 2 and 5 are bronze. Each shaft actuates two inlets and two exhaust of 1 in. diameter. The valves are Rich tungsten steel and have a lift of  $5/16$  in. The weight of connecting rod, piston, pin, rings and retainer complete is one pound  $12\frac{1}{2}$  ounces.

The valve opening mechanism is of the modified Hispano Suiza type using a light walled cylindrical cup between cam and valve stem.

The inlet manifolds are easily detachable on account of the long retaining studs which are brought out past the face of the manifolds enabling a wrench to be easily applied. Four Omac carburetors of  $1\frac{1}{2}$  ins. diameter are fitted. The detachable cylinder head which is cored for the gas passages carries a single spark plug for each cylinder. Water surrounds all sides of this plug which is threaded into a through bushing as used on the Miller engines. Ignition is supplied by a Delco battery interrupter running at camshaft speed. No generator is fitted but an emergency battery is wired to a two way switch to be used in case of failure of the regular eight volt battery.

The rush work necessary to complete the car in time to qualify accounts for the presence of the iron pipe fittings seen on the dash on the exhaust side of the engine. These are a part of the oiling system and were installed in lieu of brass fittings which were not completed in time.

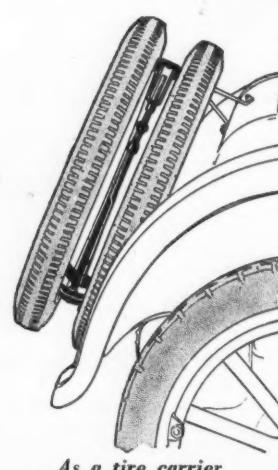
The small tank on the dash on the exhaust side is the oil reservoir for the hydraulic rear wheel brakes. Any leakage of oil in the lines or master cylinder is replaced by oil from this tank which is connected to the master cylinder.

The engine has never been block tested but pulling a club shaped propeller it was readily turned up to a speed of 6200 r.p.m. Fred Duesenberg states that the car will be raced at Kansas City on the Fourth of July.

## Duplex Second Spare Tire Carrier and Rim Tool



*Duplex second spare tire carrier and rim tool*



*As a tire carrier*



*As a rim expander*



*As a rim contractor*

Tripp-Secord & Co., Kerr Bldg., Detroit are the manufacturers of the Duplex Second Spare Tire Carrier & Rim Tool, illustrations of which are reproduced on this page. This carrier-tool sells for \$5, east of the Rockies and is made in one size only, fitting any diameter or width of rim from  $30 \times 3\frac{1}{2}$  to  $35 \times 5$ . As a tire carrier, the application is from rim to rim, the Duplex gripping the rim of the first spare while the threaded bolt offers a means of locking both tires by padlock.

As a rim tool, the Duplex acts as both contractor and expander. The cuts illustrate the application of the tool to the rim for the purpose of removing and replacing tires, quickly. The Duplex is made of selected malleables and the threaded stud is of cold rolled steel, making for strength and durability.

# Motor Age, Visitors and Letters

## The First Shot

IN this issue of MOTOR AGE we are presenting the first of the series of flat rate articles by Paul Dumas that we have spoken of several times. Just how many articles will be printed in this connection we do not now know, but there will be a considerable number of them. They will not run every week, but we will give you time between articles to digest them.

There is no question so much discussed in the automotive dealer field today as that of flat rate. We know there is a great deal of misunderstanding and a great many opinions. The endeavor in presenting these articles is to define the misunderstanding, and if possible to correlate the various opinions; and so if you do not agree with anything that is said and do not understand it, we would be glad to have you raise the question then and there. Any future articles will take into consideration all of the comment that has reached us up to that time. So if you have anything to say put it down on paper when you read the article and send it to us. If we have not made ourselves clear, ask the question that is in your mind.

## Something in the Offing

THIS brings to mind that next week we are going to start some articles that we believe will interest every ambitious automotive maintenance man. These articles will run under the general head, "Engineering for the Service Man."

These articles are the products of the MOTOR AGE staff, and regardless of whom they are written by, they present the views of all of the technical men on the staff. We hope to present some theory in the plainest possible manner and so that every live and ambitious mechanic will understand the connection between the theory and maintenance practice.

These articles have been the subject of discussion in the MOTOR AGE office for several months and some of them have been prepared for weeks undergoing revision. While they were being reviewed we sent several of them to a number of maintenance experts. We received a few criticisms and a good many suggestions; but generally the idea was very heartily approved. Whatever criticisms or suggestions were made in the letters we received from those who read the articles have been carefully reviewed and were used as a basis in final revision. The present list of topics for these articles includes 16 subjects and these will be run from time to time.

The thought of the MOTOR AGE staff in

preparing the articles was that they might form a basis for shop meetings. It is the practice in a good many shops to get the men together once a month or so, and in addition to a discussion of current business and troubles in the shop, they like to have some mechanical subjects. Several times we have been requested to furnish papers for some such meetings, and we believe that these articles will serve this purpose.

## Doing the Human Thing

WE owe you an apology for the line running on the cover page of Motor AGE last week. Instead of "Competition in Tire Sales" the article in that issue was "Some Things the Tire Manufacturer Can Do to Improve Tire Merchandising." The trouble was that we got just one week ahead and "Competition in Tire Sales" is printed this week.

We hope you will be interested in the next tire article, which considers the problems that the dealer must settle for himself.

## A New Side Curtain Idea

AMONG the interesting visitors the last week was J. W. Simpson, representing the Simplex Auto Curtain Co., Inc., Houston, Texas. This company is promoting side curtains of their design which have been used in the Houston community recently.

These curtains are so designed that they do not have to be removed from the car, but can be folded up under the top in a way that puts them completely out of sight. They provide for a liberal amount of lookout space and there is no danger of their being broken or torn by being packed under the seats. The curtains on the demonstration car looked as though they held forth the chance that the open car would be a more suitable and handy all-weather car than ever before. One great advantage of these curtains is that they can be put into place without having to get out of the car, remove the seats and do many of the things that owners of cars now object to doing.

## An English Reader

WE were much pleased recently to hear from one of our English subscribers, R. D. Hardy, a service executive, at Alnwick, Northumberland. He writes as follows:

"I shall be much obliged if you will allow me once more to become a subscriber to MOTOR AGE. I want to thank you for the manner in which you have delivered the paper to me in the past.

English motoring journals come no way near MOTOR AGE for all around value, especially to the service end of the business.

"American cars are going well over here this year. Overland fours and Buick fours are very popular. The six is used only by the more prosperous citizens because of the £1 a hp. S. A. E. rating tax. Studebakers also are popular and Essex and Moon are becoming well known, also Dodge Bros. have a big hold in Scotland and there are Fords everywhere, of course. In the truck line the Reo company are taking a good stand. Maxwell is doing fair with cars, also.

"At the Glasgow motor show I found that in most cases the salesmen of cars and accessories had but very limited experience and knowledge of automotive engineering.

"The Durant people have now introduced their car over here, and it is expected that it will make quite a stir, especially as the price is about right, and the tax is in line with the usual run of English cars.

"These 10 and 15 hp. cars over here are really only sewing machines to anybody who has seen America or just New York alone. For instance, in the Austin 7-hp. one can pick the engine out with one hand, no block and tackle being necessary.

"Petrol pumps are springing up everywhere, but many people have had them only about a year and the tins are still used quite extensively. Filling and oil stations are nil with the exception of one or two in London, I think.

"The Exide company are doing much to improve the battery service. Electrical repair shops, except in the large towns, are few and far between.

"This is a pretty rough outline of the motor world over here looking at it from your point of view. Mechanics' pay in many parts of the country is 1/3 to 1/6 an hour, i.e., 30 cents an hour for 48 hours' work. It will be a long time before England gets the one-firm-one-car service depot, properly equipped with expert mechanics. It may come in time."

## About New Cars

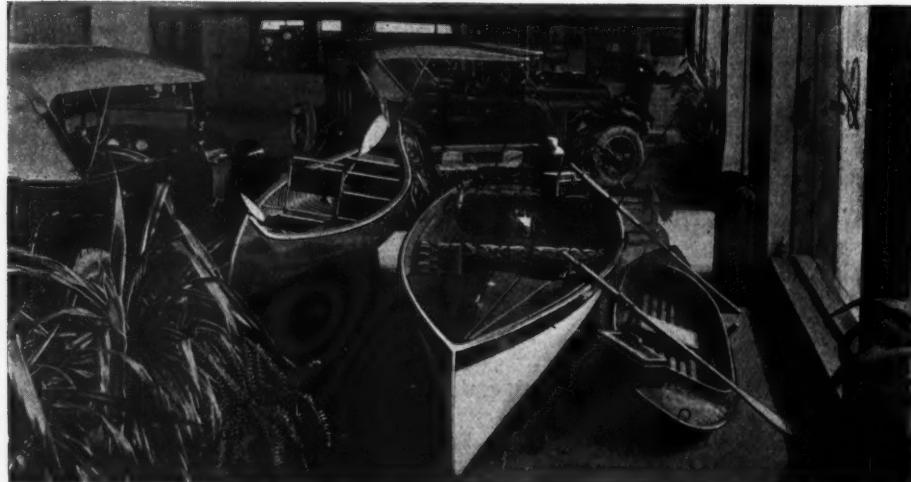
LEADERS of MOTOR AGE news columns learned a lot last week about forthcoming new cars. There was the Oldsmobile Six, to be out in September, and the new "copper cooled" Oldsmobile which will be on the market soon. Another pair of new cars, announced to the trade for the first time, were the Eagle Four and Six, to be produced by W. C. Durant. The new Packard Single Eight was fully described.

# MOTOR AGE'S PICTURE PAGES



*This picture, "shot" from where the stars probably play tag in the evening shows a part of the production of cars in years passed. It also shows the Indianapolis track and the event, of course, the one that Tommy Milton pulled a Dick Merriwell. The spot is one of the least desirable from the spectator's viewpoint and last year, there was not a car in this section, indicating how people are deserting automobile races for a day's drive behind old Dobbin*

*The Kiwanis Club of Great Falls, Mont., sent Delegate Clarence W. Conrad to the International Kiwanis convention at Atlanta in this Buick sedan. Advertising space on the car, bought by local business men, brought about \$4,000, enough to pay for the car and the convention expenses of three persons. Each buyer of advertising space has a chance to own the car through a raffle to be held upon its return*



*A prominent boat building concern is trying to extend its distribution by enlisting the motor car dealers. This is only another phase in the development of the transportation store idea and there is no reason why it should not succeed, at least in localities where boats are used*

*The dealer whose showroom is illustrated here is said to dispose of several carloads of boats each season and they are not in particularly good boating country either*

# OF AUTOMOTIVE INTEREST

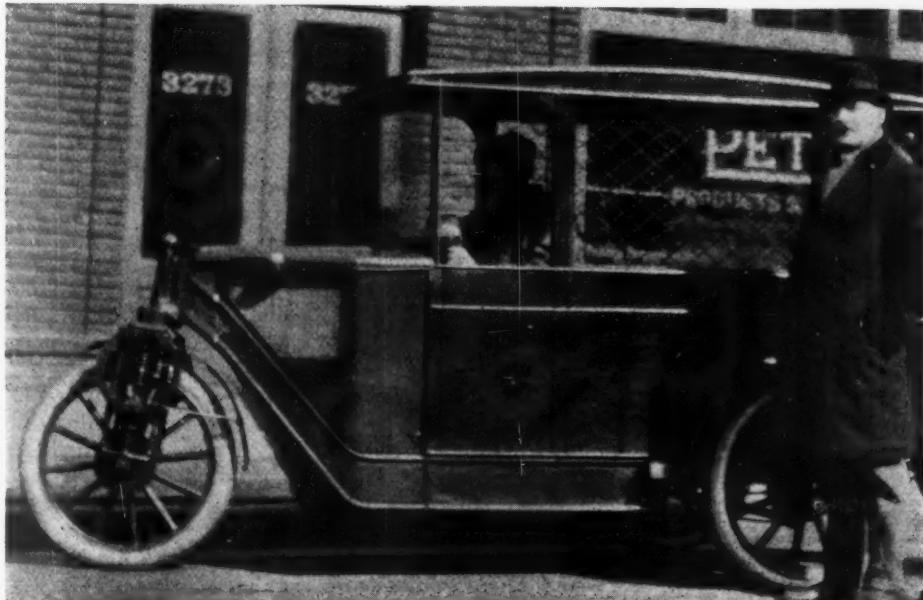


Fire drills are regular things at the Howard Automobile Co., San Francisco Buick distributors. This is an "action shot" of one of the workouts which was witnessed by Chief Murphy of the western city's fire department



Karl R. Peters, Philadelphia engineer and inventor, is shown standing beside his new product, the Peters Tri-Car, which made its debut before the public in a formal manner, the week of May 14, when it was exhibited at the Commercial Museum in connection with other Philadelphia-made merchandise. The Tri-Car, as its name implies, has three wheels, and is equipped with water-cooled motor, two radiators at the apex of the hood, a shaft front-wheel drive without a universal joint and other interesting features. The model shown is a light truck for delivery purposes, with wire-grating sides

A body built on a Ford chassis for the use of lumber salesmen was recently exhibited by the Walsh Motor Co., St. Louis. It is a miniature reproduction of a two-story English-type house, the outside walls only being used. The exterior is crushed stone stucco, with pilasters, corners and chimney of imitation tapestry brick in brown and yellow colors. The windows on each side have regular frames with French sash of fifteen lights each. Under the canopy of the miniature doors, is an electric light turned on from the dash of the car. To enable one to enter the car, the front section of the house swings forward as a door



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## Concerning Taxicabs

IT is amazing even to a student of the automotive business to what extent the taxicab business is developing in the smaller cities. Someway, most of us associate the taxicab with the larger centers of population and we are not surprised at statements of thousands of taxicabs in New York, Chicago or St. Louis, but we do not expect to find many of them in Carthage, Ill., or Meridian, Miss. But they are there.

This brings us to the realization that there must be some operating brains behind these taxicabs of the automotive type. There are two chief points in taxicab operation, one the pleasing of the public and the other the keeping of the vehicles in operating condition. We have never seen a statement as to the relative value of these two points, but both are very necessary to success. One requires definite automotive experience, the other requires the same tact that the selling of automobiles requires.

Next we realize that the manufacture of taxicabs has become a definite business. Several automobile manufacturers have taken up this work as a sideline and are making cabs according to specifications that are only in part the same as the passenger cars manufactured. These specifications admit a special requirement for this work. There is at least one quite successful company that makes only taxicabs.

The point we wish to make here is that small town deal-

ers who wish to expand might well look into this taxicab business. The shop they have for servicing automobiles might well serve for a taxicab maintenance shop. The management of the taxicab operations is a specialty, but not more so than other departments of a Transportation Store.

Above all, the present status of the taxicab calls attention to the rise of this business from the used car state to the splendid vehicle that is demanded for the short haul service of today.



*Better shop equipment means more work done.*



## The Transportation Store

CARRYING further the idea of a transportation store, one that will meet the needs of the automotive tourist, we would like to suggest that during this tourist season you give serious consideration to some items that you might handle next season. This is the time to think about it, for this is the time when you can best test the public.

Camping equipment is in great demand by automobile tourists and a good many of them are at a loss to know where to buy and what they should buy. Manufacturers say that the sporting goods stores are not handling this material exactly to their liking and comparatively few people think of a sporting goods store. In the smaller cities quite often there is no sporting goods store. In the larger cities the department stores sell most of these goods.

Then as to motor boats. Only in the larger cities are motor boats usual articles of merchandise. Again the department stores seem to have the most of the trade. Is there a lake or a river in your community that creates a demand for motor boats? If so, do you hear the call for boats? Did you know that there are regular lines of boats just as there are of automobiles? It is the automobile owner who buys boats chiefly, so why not sell to him?

Of course, where there are motor boats there is service and usually it is winter overhaul that comes in mighty handy at a dull season.

Think these two propositions over and test out your customers. Perhaps both lines belong in your store.



*The flat rate system has been proved a success.*



## A Genius or a Fool?

WHEN something new is tried it is universally condemned because no one has done it before and of course it cannot work. An engine with a cracked water jacket had been taken to several repair shops in town for the purpose of having it brazed and in each and every case the job had been turned down because on the car there was no way of reheating the cylinder block so as to do the job properly.

It was finally brought to a maintenance station where the shop superintendent used all of the good ideas he could get hold of and occasionally developed one of his own. The problem of sufficiently heating the cylinder block while it was on the car was the thing to be solved. The idea came to him that he might empty the water from the cooling system and heat the engine by running it. A perfectly possible method but one

which contained an obvious danger, that of carrying the process too far and damaging the bearings or other moving parts.

Something had to be done and he took a chance and ran the engine until it smoked. The job was done and proved satisfactory.

Any man is entitled to commendation for a spirit that has no ears for the words "It can't be done." In development work and the pioneering of new ideas ambition and determination work hand in hand with RESOURCEFULNESS BACKED BY KNOWLEDGE, but a fool cannot consistently "walk where angels fear to tread."

With full consideration for the probable high motive of the service manager it is to be regretted that any otherwise capable manager should adopt a practise which is a violation of the rules of safety and valueless as a contribution to the maintenance industry.

The success of his risky method depended entirely on the ability of the oiling system to prevent a piston seizure, probably a scored cylinder and warped valves. The best lubricating oils have a fire test of less than 600 degrees and if sufficient heat was generated by the engine to pre-heat the casting, the same amount of heat could have been applied by more conservative methods and without dismantling the engine.

One of the two or three safer methods would be to apply the heat of four torches to the cylinder block externally preferably at the water jacket level. The application of the heat by torches would be preceded by bringing the engine to a safe maximum heat by allowing the engine to run with the radiator covered until the water in the cooling system was brought to the boiling point.



*The smile brings more profits than the growl.*



## Races and Cars

OME of the advertising that is being done since the Indianapolis race is certainly misleading to the public and cannot but react on certain stock cars.

One of the advertisements that has been printed in the Chicago territory makes no mention of "special" in connection with cars that stood well in the race and other advertising slights the word "special" until the average reader will not get the significance of it. The name accorded to the cars in the race is used in such a way that only one inference can be drawn—that a stock car of that name was in the running.

It is deplorable that such tactics are followed. While such advertising may make an impression at the time on a few people, if these people buy a car on the strength of it they will certainly learn later that they have been imposed upon. This advertising appears to be dealer advertising and perhaps the dealer does not know any better.



*Only those promises should be made which can be kept.*



## Jeweler's Flat Rate

A FEW days ago we asked a jeweler in a small city if he charged his repair work by hours. He laughed.

We asked how long he thought he could survive in the repair business if he charged watch and clock cleaning jobs by labor hours.

"Long enough for the community to gossip about that plan," he said.

This jewelry establishment is more or less typical of many automotive establishments. It was formed by a journeyman jeweler and a man of the sales type. There are several employes, including a counter salesman who knows enough about the business to take in repair work. The expense is divided by the journeyman partner's salary being charged to the repair department, as well as half of the salary of the salesman. The other salaries are charged to the sales department. The concern is making money both in sales and repairs.

The head of the establishment said that all work taken in was on the flat rate, so much for the job after the journeyman partner or the expert salesman looked the job over.

Taking several watches and other jobs out of the case the jeweler said:

"On this one we made a very bad estimate. The price will only cover about half of the cost of doing the job. We overlooked a serious defect. On this solder job, we will lose some money but in the main our diagnoses are correct. We frequently slip up on a watch we are not familiar with but not badly. Some watches are much more difficult to clean and lubricate than others but the averages are good. The Swiss watches are our chief trouble and we have a special price list for them."

This was in a railroad town where watch repairing is a closely watched industry and the work must prove itself. The clientele is discriminating and knows what repairs should cost. Watches average a higher standard than in many communities.



*Building public confidence is slow work but it pays big returns.*



## Sparkling Speed

WE didn't try to check their speed with a stop watch or anything like that but we have it on fairly reliable authority that while the cars were loafing around the track the little electric microbes were running around the wires, hopping across the spark plug gaps, and playing leap frog around the distributor at the rate of some 186,000 miles a second, or about 116,000 times as fast as the cars were going. We can hardly blame them if they really did make fun among themselves of the "speed" of the cars.

When the winning car was jogging along at some 96 m.p.h. its engine was turning over at about 4600 and as its engine needed four sparks at each revolution (not eight as some insist), the electric microbes had to knock off from their sport every now and then and blow up a charge of liquid dynamite, just to let the pistons know they were not put there for ornament.

Then in the course of the 500 mile journey the ignition system had to deliver somewhere between five million and six million sparks. The battery ignition interrupter and distributor had to turn at half engine speed or some 2300 r.p.m., but even running half as fast as the engine it was able to keep up with it, some way or other.

When it comes to turning up high speed in an ignition device, the magneto on one of the Packard cars had a real job on its hands and from what we hear did its part of the work without calling for help. Being a six cylinder animal it had to turn at one and a half engine speed or about 7200 r.p.m., and accordingly the magnetism had to reverse and the interrupter points operate twice that fast or some 14,400 times a minute.

# Rural Sales Show Steady Increase

## Car Factories Maintaining Production at May Rate

### Attention Focused on Open Models as Demand for Enclosed Types Exceeds Capacity

NEW YORK, June 18—Reports for the first week of June indicate that production of passenger cars and motor trucks is keeping to the level maintained the last week of May, when a quickening pace as compared with the earlier part of the month was manifested. It is not thought likely, however, that the shorter working month, with a sequence of unusually high production records behind it, will reach the 405,000 mark established in May.

Sales are taking a greater swing toward agricultural districts and whatever slowing down in demand is evidenced in the larger cities is being made up to a large extent by more active buying in farming regions. This is especially true of open models which continue their popularity among country buyers although stocks have accumulated in dealer's hands elsewhere. Measures are being taken by some manufacturers to focus greater attention on the merchandising of these models and so reduce the stocks to a more comfortable size.

Stress has been placed on the advantages of the closed car with the result that dealers have many unfilled orders for this type which manufacturers cannot meet through the inability of body building plants, working at top speed, to promise immediate deliveries.

Better conditions among farmers, particularly in those sections of the country where the aftermath of the war was felt most keenly, are being reflected in greater interest in motor vehicles and the resultant forward movement in sales. In Iowa, one of the States where the depression was severe in its effects, farmers have met their obligations and conditions are assuming a more encouraging aspect. The favorable prospect for good crops is as important a factor in the more cheerful buying disposition of the farmer as the greater amount of money he has on hand today with which to make purchases. In some states, however, backward collections show less satisfactory conditions than are to be met in Iowa.

Overseas demand is taking an increasingly large proportion of the output of American factories and manufacturers are looking with greater optimism toward foreign markets. For the first four months of the year consumption abroad of American made cars and trucks is estimated at 107,000, an increase of 50 per cent over the corresponding period last year and representing 8.5 percent of the output of factories in the United States and Canada and of Ford's foreign assembly plants.

## LENS LAW IN VIRGINIA

RICHMOND, Va., June 16—No motor vehicle, whether in use or not, can be equipped with lamps having plain glass lenses in Virginia after June 27, according to a new law which will go into effect on that date. A list of approved lighting devices is being compiled by the Secretary of the Commonwealth and will be issued at an early date. Checking stations are to be established in various centers throughout the State, where motorists can have lights properly focused and adjusted according to law.

## May Shipments Established New High Record for Reo

DETROIT, June 16—Reo Motor Car Co. set new high shipment records in May, exceeding March of this year, previous high, by a large margin and running 35 per cent in excess of May, 1922. In making the record there was no forcing of shipments, said R. C. Rueschaw, general sales manager, but simply an effort to meet demand to the best of the company's ability.

It is encouraging, said Rueschaw, that shipments were uniform throughout the country. Demand for Reo cars and speed wagons has been steady in every part of the country. At the present, he said, there is scarcely a territory containing soggy spots and business seems to be generally very healthy.

Outlook for late summer and early fall is equally promising, he declared. Dealers in agricultural districts declare outlook favorable and this is coupled with a continuance of steady demand from the cities.

The Reo plant will be closed the first two weeks of August to make necessary repairs and alterations, according to notices posted at the plant.

## TO MAKE NEW TYPE ENGINE

NEW YORK, June 18—The American Crude Oil Motors Corp. has been formed for the purpose of exploiting the Acro crude oil engine of German design, in this country, with A. Wielich at the head of the organization. With this idea in mind, it has just brought over the first of these engines, with Dr. Franz Lang of Munich, the inventor, in charge, and is displaying it at 153 Hudson street, this city. The engine has not been put into production either in Germany or this country, but efforts will be made to interest American manufacturers in the invention.

## S. A. E. SUMMER MEETING

NEW YORK, June 16—With 685 reservations actually enrolled, it looks as if the summer meeting of the Society of Automotive Engineers, which will be held at Spring Lake, N. J., June 19-23, will be the best attended in the history of the big organization.

## Organizing New Columbia Company to Take in Liberty

### Plant of Latter, to Be Sold July 17 By Receiver, Would Be Used to Make Both Lines

DETROIT, June 16—Negotiations are under way for the uniting of Liberty Motor Car Co. and Columbia Motor Co. under the name Columbia Motors Corp., the company to manufacture both lines of cars at the Liberty plant. If present plans are brought to fruition, J. G. Bayerline, president of Columbia, will be president of the company, with A. R. Demory, former president of Timken-Detroit Axle Co., chairman of the board, and C. R. Talbot, vice-president of the National Bank of Commerce, Detroit, will become a member of the board.

The negotiations are being worked out by the creditors committee of Liberty with officers of the Columbia company and financial interests headed by the Bank of Commerce. It is expected that details will be completed within a month thus giving opportunity to bid in the Liberty plant by July 17, the new date of sale fixed by the receiver.

Formation of the company will mean a considerable strengthening in the specialized unit car field. Columbia, already one of the leaders in this branch of industry, will be given the advantage of the modern Liberty plant, declared to be one of the best assembly units in the industry. Present quarters of Columbia which are leased would be given up on expiration of lease and activities centered at Liberty.

## TRACTOR SALES INCREASE

MINNEAPOLIS, June 16—A substantial increase in the sale of tractors is reported by J. W. Gray, president of the Gray Tractor Co., Inc. Gray declares that present agricultural conditions, demanding the greatest efficiency on the part of the farmer in order to make a profit, are the forerunner of still greater tractor sales.

## D. G. ROOS PROMOTED BY DURANT

BRIDGEPORT, Conn., June 11—D. G. Roos, who has been chief engineer and production manager at the plant of the Locomobile Company, has been elected vice-president of the local plant, now one of several in the chain of automotive interests of W. C. Durant. It is intimated that Vice-president Roos will be continued at the plant here.

## FRANKLIN CLOSED CAR OUTPUT

SYRACUSE, N. Y., June 16—Franklin closed car production so far this year is 74.4 per cent of the total, according to H. H. Franklin, president of the Franklin Automobile Co. In May closed cars constituted 91 per cent of Franklin production.

## Dealers in Body Visit Those of Nearby Town

SPRINGFIELD, Ill., June 16—For the purpose of getting acquainted and also picking up some ideas that might be of value, the membership of the Springfield Automobile Dealer's Association drove to Peoria on Tuesday, June 12, and spent a day calling on the dealers in that city. All of the agencies were visited and the visitors were given a hearty welcome by the Peoria automotive representatives. The Peoria dealers were invited to drive to Springfield at some future date and see what this city has to offer. Similar trips are planned by the Springfield dealers to Decatur and Bloomington. It is believed that this fraternal spirit will prove of value to all concerned.

## Buses Bring Rural Schools Up to Standards of Cities

CHARLOTTE, N. C., June 16—The transportation of school children in the rural districts to and from school by motor vehicle has proved so satisfactory in this county, Mecklenburg, that the county board of education has decided to add 10 additional trucks to the seven which have been in operation for the past year. The 17 trucks will gather up the children in 11 districts and carry them from their homes to school and back again. The trucks haul about 80 children in two directions, to and from school.

This method of handling the pupils permits better school facilities in every way. Twenty-eight districts have been combined to make the 11. One and two teacher schools have been done away with, as well as one and two room buildings. Modern buildings for complete grade work through the high school courses have been provided and a full corps of teachers for each school secured.

### A LITTLE PLAY FOR THESE

PHILADELPHIA, June 16—One of the pleasantest annual outings in the history of the Automobile Accessories Business Association of Philadelphia was held at Betzwood Farms Inn, Betzwood, Pa., on Friday, June 8. At 8:30 in the morning the cars of members and guests began to form in line at Broad and Calowhill streets and shortly thereafter the procession, consisting of 15 automobiles containing 60 men, started for the beautiful grounds for long used as headquarters for the motion picture production company.

### FORD MOVES SPANISH PLANT

DETROIT, June 18—Ford Motor Co.'s plant in Spain has been moved from Cadiz to Barcelona because of the greater adaptability of the latter point for distribution and also because of better labor conditions making for improved manufacturing.

## Texas Automotive Men Form Home Finance Corporation

DALLAS, Tex., June 18—Prominent Dallas, Fort Worth and Waco automobile and business men have organized the Investment Finance Corporation of Dallas with a capital stock of \$500,000. The company will make a specialty of handling monthly notes of dealers in Dodge, Ford and other standard makes of automobiles sold by dealers in North Texas on the plan of so much down and the remainder in a certain number of monthly notes.

E. Gordon Perry, head of the Dodge agency in Dallas and vicinity, is president of the company. E. R. Brown, vice-president and general manager of the Magnolia Petroleum Co.; Frank Rozen-craft, former mayor of Dallas, prominent lawyer and financier; S. B. Perkins, wholesale dry goods man of Dallas; W. S. Cooke, automobile man of Fort Worth; Joe Mitchell, automobile man of Waco; E. H. Boyd, automobile man of Fort Worth, are among the directors of the new corporation.

### FAVORABLE TURN IN TOLEDO

TOLEDO, June 18—A much more favorable turn has been noticed in sales of open cars in the last week, dealers here report. The coming of warmer weather and dissipation of a feeling that a slump was near has materially aided the selling end of the industry. While sales fell off about 20 per cent in May, it is believed that June will show a good comeback. Dealers are still having difficulty filling the demand for closed cars and have few cars ahead of schedule in stock.

The used car market is slower but is expected to show some improvement. The local automobile plants show a slight decrease in employment June 1 as compared with previous month, but during May production records were broken. The greater plant efficiency at the Willys-Overland Co. enabled a new one month record of 22,282, cars to be turned out. The last three days of the month broke the one-day record with productions of 1066 cars each day.

### FORD BUSY AT MEMPHIS

MEMPHIS, Tenn., June 16—The Ford plant at Memphis is delivering 4000 assembled cars this month. The first four months of 1923 were equal to the total deliveries of 1920. The tractor business has approximated three times the business done last year. The repair parts shows an increase of 40 per cent over 1922.

### AUBURN HAS BEST MONTH

AUBURN, Ind., June 16—Production of Auburn automobiles in May was the greatest of any month since the company was established 23 years ago, according to A. P. Kemp, president of the Auburn Automobile Co. The increase over May of last year was 110 per cent and the output to date this year is greater than that for all of the last year.

## Railroad's Traffic Cops to Guard Crossings

BRIDGEPORT, Conn., June 18—In an attempt to minimize automotive railroad grade crossing accidents, which have been on the increase of late and are especially numerous during the summer season, General Manager C. L. Bardo of the New York, New Haven & Hartford Railroad has directed that representatives of its police department be "dressed up" in natty uniforms and be assigned to assist crossing tenders in regulating traffic at various times, especially on occasions when there is heavy automobile travel.

## Three Tire Manufacturers Close St. Louis Branches

ST. LOUIS, Mo., June 18—The retail branches of the Fisk, Federal and Brunswick Tire companies have been closed here and the companies will operate from their various warehouses. Because of the small volume of sales made by the retail branches the cost of upkeep was considered a waste.

The Kelly-Springfield Co. and the Goodyear Tire Co. adopted this plan some time ago.

The Fisk-Federal Companies have merged and now occupy building at 4200 Forest Park boulevard, while the Brunswick tires are being handled along with the other lines of the Brunswick-Balke-Collender Co. from its warehouse at 915-917 North Sixth street.

### ALABAMA DEALERS PLAN MEETING

BIRMINGHAM, Ala., June 20—Word reaching Birmingham is to the effect that big things are being planned for the Alabama Automotive Trades Association meeting to be held in Mobile July 23-24. Governor Brandon of Alabama will address the association, and several members of the legislature will be invited.

A number of automobile men from the adjoining states will be present at the meeting. The business sessions will be staged at the Battle House and one day will be spent on the Bay Shore, probably at Point Clear.

It is planned to have certain advocated legislation pertaining to the automotive industry discussed at the convention. J. B. Farley, of Montgomery, secretary of the association, has been in Mobile during the past week making arrangements for the meeting.

### BODY FIRM MERGER PLANNED

DETROIT, June 16—Consolidation of Briggs Mfg. Co., manufacturer of bodies, and Michigan Stamping Co., one of the largest metal stamping companies in the industry, is being worked out and details are expected to be completed within the next week or 10 days.

## 13 CARS ENTERED IN 250 MILE RACE, KANSAS CITY, JULY 4

### Milton and Cooper to Drive H. C. S. Specials—Wilcox Listed to Wheel a Duesenberg

KANSAS CITY, Mo., June 18—The second occasion for the use of the Kansas City Speedway for motor races, will be July 4, when races under the title of National Championship will be run. The Kansas City speedway is a wood track, one and a quarter miles. The Independence Day event will be 250 miles, under

A. A. A. auspices. The first race on this speedway was September 17, 1922. Tommy Milton was the winner and Harry Hartz second. Both of these are entered for the July 4 event.

Entries indicate that none of the cars actually used at the Kansas City event last fall will be used July 4, but all except two Duesenbergs were in the Indianapolis event. All the cars entered are the new 122-inch development, single place cars.

The entries up to June 15 were:

Name of Car	Driver	Entered by
H. C. S. Special	Tommy Milton	Harry C. Stutz
H. C. S. Special	Earl Cooper	Harry C. Stutz
Durant Special	Jimmie Murphy	R. C. Durant
Durant Special	Harry Hartz	R. C. Durant
Durant Special	Eddie Hearne	R. C. Durant
Durant Special	Jerry Wonderlich	Jerry Wonderlich
Duesenberg Special	Bennett Hill	Fred Duesenberg
Duesenberg Special	"Howdy" Wilcox	Fred Duesenberg
Duesenberg Special	Dave Lewis	Fred Duesenberg
Durant Special	Frank Elliott	Frank Elliott
Durant Special	Harlan Fengler	Wm. White
Wade Special	Not Named	Geo. L. Wade
Red Bird Special	Leon Duray	Leon Duray

### RUBBER MEN ORGANIZE

NEW YORK, June 18—The American Rubber Manufacturers, Inc., was formed here at a meeting held Friday afternoon, with an announced platform to look after the interests and problems of the rubber manufacturers and to encourage the development of rubber growing all over the world.

T. R. Palmer of the Continental Rubber Works of Erie, Pa., was chosen president; C. E. Murray of the Murray Rubber Co., Trenton, N. J., treasurer, and O. M. Mason of the Mason Tire & Rubber Co., Kent, O., secretary pro tem. Four of the nine directors also were named, including Palmer, Murray and Harvey S. Firestone of the Firestone Tire & Rubber Co., of Akron, and L. A. Brown of the Firestone-Apsley Co. of Hudson, Mass. As yet a general manager has not been selected. Neither has it been decided whether the headquarters shall be in Washington or New York.

### ANOTHER FORD DAY

SALT LAKE CITY, Utah, June 16—Malad, Idaho, just across the Utah border, held a Ford Day on Saturday. Prizes were given for the best decorated car, fastest driving, the oldest Ford driver present, the driver with the largest family and other things. The oldest driver was a man named Thomas, 79 years of age. The man with the largest family brought in a crowd of 12 children.

### GRAY MAKING 125 A DAY

DETROIT, June 16—Gray Motor Co. is now building 125 cars a day and has orders ahead for fully a month's capacity operation. The company is adding to the number of dealers as its capacity is increased.

### Pedestrian Must Heed the Law or Pay the Price

NEWARK, N. J., June 16—The City Commission has passed an ordinance providing imposition of fines ranging from \$2 to \$25 upon pedestrians crossing street intersections diagonally. It also is a misdemeanor for one to cross streets while the traffic sign is set against him.

### ALSO IN THE 1,000,000 CLASS

FORT WAYNE, Ind., June 18—Officials and employes of S. F. Bowser & Co., Inc., will hold an informal celebration June 22 to mark the completion of the 1,000,000th self-measuring gasoline pump. Production of pumps by this company, according to President S. B. Bechtel, has developed with the growth of the automotive industry.

### TRUCK SHOW POSTPONED

DETROIT, June 16—The motor transportation show planned by Motor Truck Industries, Inc., has been deferred by the association indefinitely, and it is likely that a date in the spring will be selected rather than in the late months of the year.

### TOTAL FORD OUTPUT

DETROIT, June 16—Complete figures on Ford output in May, combining domestic and export business, shows a total of 201,038 units, divided as follows: Ford cars and trucks, 189,177; Fordson tractors, 11,083; Lincoln cars, 778.

### Dorris Stockholders Join in Approval of Merger Plan

### Consolidation With Winton and Haynes Companies Now Has Endorsement of All Three Groups

KOKOMO, Ind., June 18—Financial interests are now preparing to make effective the merger of the Haynes, Winton and Dorris automobile companies into the Consolidated Motors Corporation, capitalized at \$19,000,000. Approval of the merger by stockholders of the Dorris company at St. Louis Saturday marked the endorsement of the plan by the investors in the three companies, Winton and Haynes shareholders having approved the plan previously.

It is understood that Consolidated Motors will be a holding corporation and that each of the three component companies will continue as an operating company. The three makes of cars are to be continued and it is likely that a fourth car to sell for \$1000 or less will be added.

### VACUUMETER TO CLEVELAND

CLEVELAND, June 16—The Vacuume-ter Co., has moved to this city from the South and is now engaged in production at its plant in the Arcraft Building at 2530 Superior avenue. The company manufacturers an instrument, which when mounted on the dash of an automobile, enables the driver to tell at a glance whether the vacuum is working properly, the amount of fuel consumed on a single trip and the total amount used.

The officers of the company are C. M. Barnes, vice-president and in charge of sales; James H. Farish, vice-president and director; J. R. Dangler, vice-president; R. E. Armstrong, general sales manager; J. J. Albright, chief engineer; and B. Crawford Jenkins, director.

### U. S. PUBLISHES STANDARDS

WASHINGTON, June 15—Representatives of the Society of Automotive Engineers, the Society for Testing Materials, the American Engineering Standards Committee, the National Association of Manufacturers, and other organizations have agreed to support the Department of Commerce in the publishing of a handbook on specifications and standards of 5000 varieties of commodities purchased by the government.

### WILL SHOW AT COUNTY FAIR

QUINCY, Ill., June 19—The Quincy Auto Trades Association plans to place a great display at the Adams County fair this year and will pitch a monster tent near the grandstand. It will be floored and protected from the track dust. Many dealers favor this exhibit over the spring show and there is no question but that last year's program brought in very encouraging business.

## French Stock Cars in Test Run Make Excellent Showing

### Chenard-Walcker Is Victor With 29 Other Cars in 24-Hour Road Race

PARIS, June 1—(By mail)—A distance of 1372.5 miles, equal to an average of 57.1 miles per hour, was covered in the first twenty-four hour road race to be held in Europe, by a 183 cubic inch Chenard-Walcker stock four passenger car. The race was the first of a series of competitions for the Rudge Whitworth cup and was held over a permanent triangular circuit 10 miles round, near Le Mans. Only one man was allowed aboard at a time, and no outside assistance could be given. All classes of cars were admitted and with the exception of the 67 cubic inch models had to be equipped with four passenger bodies and carry 396 pounds of ballast. Although officially considered an elimination, with a minimum distance to be covered in order to qualify, the event was a race from beginning to end.

Second position was secured by a Chenard Walcker similar to that which won, the distance covered in the twenty-four hours being 1327 miles. Third place was won by a 122 cubic inch four passenger Bignan with an overhead valve engine having positive valve closing mechanism. It covered 1284 miles. The English 183 cubic inch Bentley, tied for fourth place with another 122 inch Bignan, the distance being 1198.5 miles.

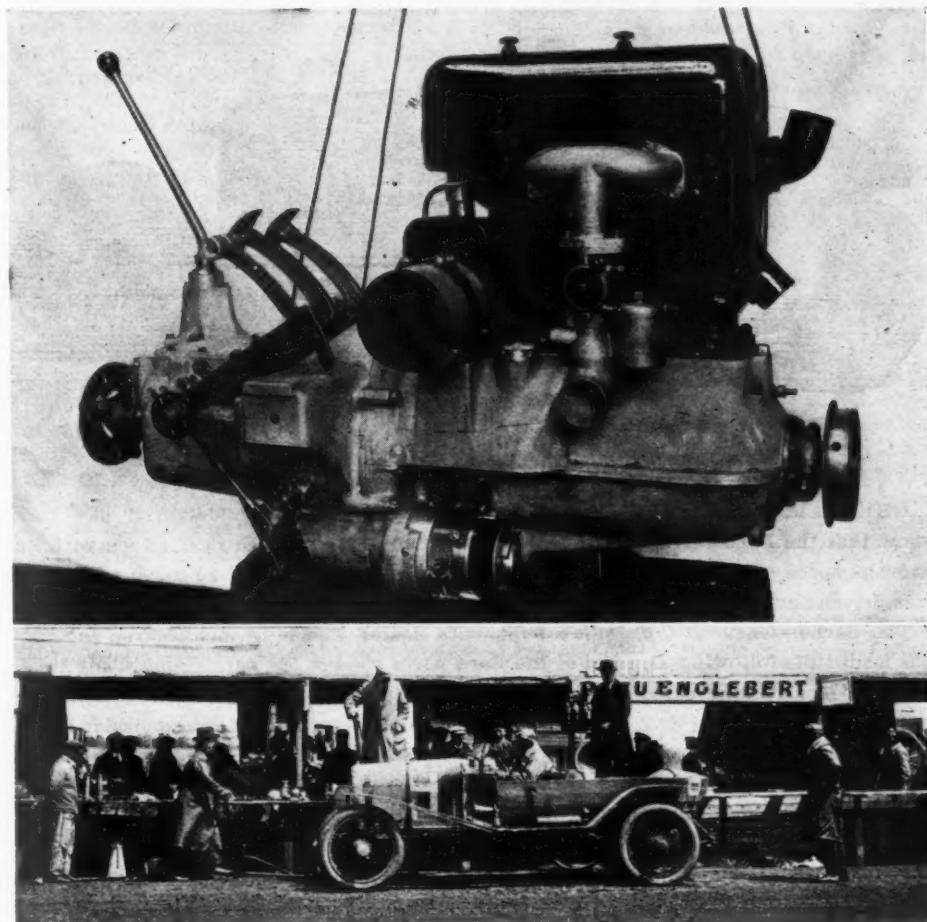
#### 30 Cars Finish

Of the 33 cars to start, 30 went the entire distance. There were few mechanical failures, lighting sets gave considerable trouble, and drivers suffered severely from rain and mud, particularly in the first half of the race.

The engine used on the winning Chenard-Walcker was a four cylinder overhead valve sporting model with the overhead camshaft driven from the rear by a vertical shaft and developing its maximum power at 3400 r.p.m. This car was fitted with Perrot front wheel brakes operated through the Hallot servo mechanism.

The 122 inch Bignan, which secured third place is a four cylinder model with positive valve closing mechanism. There was an interesting demonstration between this and another and similar car having spring closed valves. The car with the positive valve closing mechanism was decidedly faster than its companion. According to the makers, the engine with spring controlled valves cannot exceed 3600 r.p.m. while its companion can be run as high as 4500 r.p.m., with a gain of 10 hp. On some stretches of the course the engine turned over at 4300 revolutions. The mechanism gave no trouble and the car went through the twenty-four hour event without any mechanical work being done on it.

## Average Speed of 57.1 M. P. H.



The four-cylinder engine used in the winning Chenard-Walcker. The engine develops its maximum power at 3400 r.p.m. Below, the winning car at the pits, taking on supplies

#### MOVING INTO LINCOLN PLANT

DETROIT, June 18—The addition to the Lincoln Motor Co. division of Ford Motor Co. is completed to the extent that the motor assembly department has started moving in. This is the first of several changes that will reorganize the various departments and the place they occupy in the building arrangement to make for increased production efficiency. Other departments will be moved as rapidly as the new building is ready for them. Completion of the new building will not mean a large increase in total cars built though it will mean a stepping up from the present 25 to 30 cars daily to around the 35 daily mark.

#### STEADY SALES IN MILWAUKEE

MILWAUKEE, Wis., June 18—Retail business in passenger cars is settling down to a steady, normal gait after three months of rather hectic supply and demand. Deliveries from factories are coming steadily and while enclosed types are still scarce and dealers behind on orders, open cars are in moderate supply and nearly all dealers are able to make immediate delivery. It is stated, however, that there is no uncomfortable accumulation and confidence is everywhere expressed in the local dealer trade that every car scheduled to come, up to Sept. 1, will find a ready market.

#### WALTER E. FLANDERS KILLED

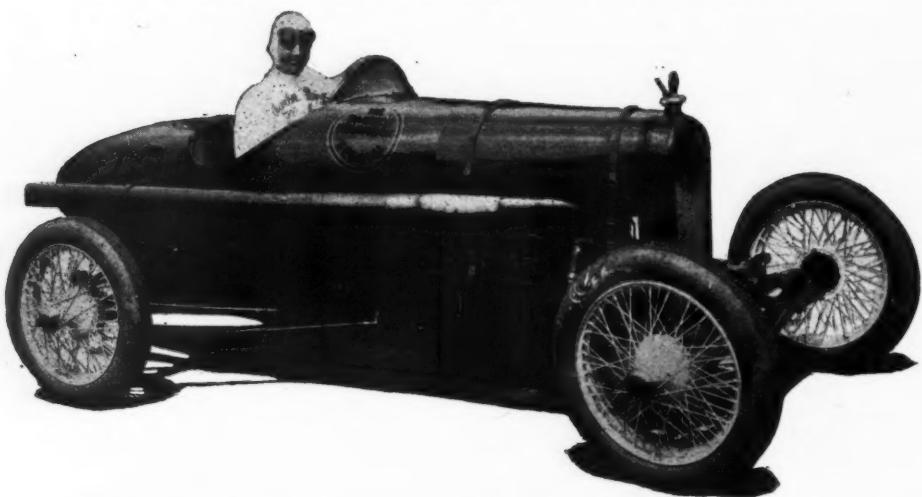
DETROIT, June 18—The death of Walter E. Flanders, pioneer in the automotive industry, was made known in telegraphic dispatches received here from Newport News, Va. With a party of friends Flanders was driving to Newport News from his estate near Williamsburg. Passing another car, his automobile went into a ditch and turned over. He was taken to a hospital where he died Saturday.

Flanders was the originator of the E. M. F., one of the first popular priced large production cars. The company making this car was absorbed by the Studebaker. From 1911 to 1919 Flanders was head of the Maxwell Motor Co. Since his retirement from Maxwell he had been frequently mentioned in connection with other automotive undertakings, but he did not again enter actively into the business.

#### FIAT BUYS FACTORY

PARIS, June 1—(By mail)—The Fiat Automobile Co. of Turin, has purchased the Ansaldi San Giorgio engineering works in Turin. This establishment, which originally belonged to the Fiat Company, under the title Fiat San Giorgio, specialized in semi-Diesel stationary and marine engines and was sold to the Ansaldi company shortly before the war.

## The Barber-Warnock Special and Its Driver



INDIANAPOLIS, June 18—Calculations made following the Memorial day race show that the Barber-Warnock Ford special, which finished fifth in the race with an average speed of 82.58 m.p.h., ran the last 100 miles at the rate of 86 m.p.h. This car was driven through the entire race by L. L. Corum.

The Barber-Warnock Co., Indianapolis Ford dealer who built and entered the car, has issued the following as a list of the Ford parts used in the car: Connecting rods, cylinder block, crank case, breather pipe, babbitt bearings, cam shaft, front axle, tie rod and bolts, front spring, spindle bolts, frame, cross members, transmission complete with pedals, controller with brakes, shaft and arms, universal joint, propeller shaft tube, rear radius rods, rear spring, brake rods, purchase and shackles, rear axle, bolts and nuts, radiator hose, hose clamps, Champion spark plugs.

The Barber-Warnock Co., whose address is 813 East Washington street, Indianapolis, states that it will be glad to send free to any Ford dealer or owner a photograph of the car together with details of its construction.

### COURT ACTS IN MITCHELL CASE

MILWAUKEE, Wis., June 18—The appointment of James D. Shaw of Milwaukee as attorney and counsel for Herbert F. Johnson of Racine, trustee of the bankrupt estate of the Mitchell Motors Co., Inc., has been set aside by the Federal court at Milwaukee, which upheld the objection of certain creditors that Shaw is a member of permanent counsel for the Milwaukee Electric Railway & Light Co., one of the creditors. This decision was based on a rule of long standing that an attorney representing creditors of a bankrupt estate shall be disqualified to act as attorney for the trustee of such estate.

### PREPARE FOR ELGIN PRODUCTION

INDIANAPOLIS, June 18—Work of remodeling the new plant recently acquired by the reorganized Elgin Motors is progressing here under the direction of President Joseph McDuffee. General offices are being laid out in the two-story plant, and the floors of the large assembly building and stock rooms are being arranged for active production which is planned for early fall. Announcement of the design of the new Elgin and of the staff of the factory and general offices will be made shortly, it is expected.

### 6000 SALES IN SALT LAKE

SALT LAKE CITY, Utah, June 16—Up to May 31, according to figures com-

pled by the Intermountain Automotive Trades Ass'n, Utah dealers had sold 6000 new cars and trucks since the beginning of the year. The average price was \$1000, or a total of approximately \$6,000,000. Exact figures as to the number of cars sold in proportion to trucks are not available, but the truck business does not appear to have been heavy.

### GRANT PROPERTY SOLD

CLEVELAND, June 16—The Lincoln Electric Co., of this city, has purchased from receivers, the property of the Grant Motor Car Corporation. The price paid is \$426,000.

The purchaser will move from its present quarters shortly to the Grant plant, in which it will increase its production of electric motors.

The personal property of Grant will be disposed of at auction within the next 30 days. The service department of Grant has been sold to the Standard Motor Parts Co.

### NEW HAYNES AT \$1295

KOKOMO, Ind., June 18—The Haynes Automobile Co. has announced a new line of cars, known as the model 60, at lower prices. The touring car is priced at \$1295, standard sedan \$2295, sport touring \$1750, sport roadster \$1695, sport sedan \$2495 and sport brougham \$2195. These cars are built on the 121 inch wheel base chassis.

## 25,000 Miles of Federal Aid Roads; 39 Per Cent Gravel

### 18 Per Cent Is Concrete and 20 Per Cent Is Graded and Drained

WASHINGTON, June 16—The latest available figures given by the Bureau of Public Roads show that of the 25,000 miles of Federal-aid roads now in use 39.1 per cent were of gravel construction; 20.6 per cent graded and drained; 18.3 per cent cement concrete; 10.8 per cent sand clay; 4 per cent bituminous macadam; 3.1 per cent bituminous concrete; waterbound macadam, 2.7 per cent; and 1.4 per cent brick.

### NEW FORD FACTORY STARTS UP

DETROIT, June 18—The Ford Motor Co. plant at Green Island is now in production on radiators and T-12 ring gears. Manufacturing of other equipment has been delayed by slow deliveries of machinery but when installed the company states the plant will be second in production only to the Detroit plants. Expansion of the plant is to be in line with actual requirements. In this connection the manufacture of springs will soon be started, adding 400 to the present 625 men.

The Green Island plant will be one of the first to feature the Ford principle of employing farmer help during the winter months, permitting them to work their farms during the summer months. The company is also contemplating an extensive program of improvement and development of the waterways of the section, including an all-water route to Detroit. The property will be flanked by a massive concrete water front and this dock system will be equipped with cranes and other requirements for extensive water shipping.

### 40,346 FORDS IN WEEK

DETROIT, June 16—Production of Ford cars and trucks in the week ending June 12 was 40,346, an increase of 783 over the week ending May 29, previous high. A new high daily record was set June 12 with 6788, a gain of seven over May 28. Tractor production in the week was 2698 and Lincoln manufacture 174. On June 8 the company built engine number 7,777,777, the engine going to the Los Angeles assembly plant where it will find its market.

### OAKLAND OFFICIALS HONORED

PONTIAC, Mich., June 18—George H. Hannum, president and general manager, and E. M. Orr, assistant general manager of the Oakland Motor Car Co., were tendered a dinner by the other department heads, officials and factory superintendents of the company June 11 at the Aviation Country Club. The occasion was the second anniversary of the coming of these two officials to the Oakland company.

## Credit Men Estimate 73 Per Cent of Cars Sold on Time

### Reports of Automobile Financing Credit Men's Association Help Prevent Frauds

NEW YORK, June 18—A new line of credit information has been opened up through the acceptance by the directors of the National Automobile Chamber of Commerce of the offer of the Automobile Financing Credit Men's Association to co-operate in stamping out such evil practices as duplicating financial transactions by unscrupulous dealers and preventing as far as possible the financing of a car twice by those watching for such opportunities.

It is felt by the Automobile Financing Credit Men's Association that this will improve the dealer personnel and that by encouraging car manufacturers to submit to it the names of new dealers that it will tend to prevent persons who have proved irresponsible in their dealings with finance companies and in the handling of automobile paper to secure new contracts. This in turn will be reflected in the standing of automobile paper and its reputation with the banks. It will result in the securing of better dealers, it is thought, and the manufacturers will be able to exercise more care and discretion in selecting their retail representatives if the credit association can give them a line on the records of the applicants.

The Automobile Financing Credit Men's Association was organized in 1919 by F. B. Taylor, with seven companies in the lineup. It has grown since then until now it has 48 members in New York City, among which is the General Motors Acceptance Corp., and 24 in Chicago. It carefully checks all financial transactions having to do with selling automobiles on time and since its organization it claims to have turned up 5000 duplicate transactions and to have saved its members \$700,000. As showing the scope of its work, it recorded 95,892 mortgages in May of this year. In the same month it reported 658 conflicts in serial numbers, which prevented the financing of cars twice.

Statistics gathered by the association show that last year \$1,600,000,000 worth of cars were sold through time payment sales, of which total 66 per cent was handled by the Taylor organization. Seventy-three per cent of the 1922 production of passenger cars was sold on time payments, it is said.

### Buick Production Mounts to New Record for Month

FLINT, Mich., June 16—Production of more than 19,500 Buick cars in May sets a new high record for that company for one month. Prior to September, 1922, the largest number of Buicks made in one month was 13,200, but last September the high mark of 15,000 was reached. This was surpassed the following month

with 17,500 cars. Average output for the succeeding six months was approximately 16,700. Last April this figure was raised to 19,000 and in May to something more than 19,500.

Discussing the outlook for the remainder of this year, President H. H. Bassett of the Buick company, said he could see no reason why the last six months should not produce equally as good result for the automobile trade as the first six months.

### 800 Registrations for A. E. A.'s Summer Meeting Next Week

CHICAGO, June 16—About 800 registrations have been received by the Automotive Equipment Association for its annual summer meeting at Dixville Notch, N. H. This indicates one of the best attended meetings the association has ever held.

The special train from Chicago which will go by way of Detroit, Toronto and Montreal will have more than 200 on board upon its arrival at the convention city. Of these 152 are scheduled to depart from Chicago and the remainder will be picked up enroute. The Chicago delegation will include many members from the west and southwest.

An unusual feature is the number of members who are motoring to the convention. Reports have been received here by the A. E. A. that some from points in the central west already have started east by automobile, expecting to arrive at Dixville Notch for the opening of the convention on June 25. Many of the members from the eastern states also are motoring. Most of those going by automobile are combining their annual vacations with the convention trip.

Manufacturing and jobbing members in the New England states and in cities through which the delegations are to pass are extending general invitations to all members to visit them and enjoy their hospitality. The convention will close July 1.

### M. A. M. A. YEAR BOOK OUT

NEW YORK, June 16—The 1923 Year Book of the Motor and Accessory Manufacturers' Association has been mailed to members. It is a pretentious little publication prepared by M. Lincoln Schuster, assistant to the general manager and manager of the Educational Department. Annual reports, a list of members, and valuable statistics are given, the frontispiece being a colored reproduction of the Spirit of Transportation, one of the prize winners in the series prepared by the Clark Equipment Co. Who's Who at Association's Headquarters introduces pictorially the men who are responsible for the M. A. M. A.'s activities and also shows views of the executive offices.

### PASK GOES WITH STUDEBAKER

FORT WAYNE, Ind., June 18—Charles A. Pask, advertising manager of the Wayne Tank & Pump Co., of this city, has resigned to become assistant advertising manager of the Studebaker Corporation, at South Bend, Ind.

### Medium Priced Car Sales Increase in New York City

### Slight Decline Noted in Registration of High Priced Types as Compared With April

NEW YORK, June 16—A slight increase in registrations of low and medium priced cars and a decline in those of higher priced cars in the Metropolitan district during May as compared with April is shown in the analysis of automobile sales as compiled by Sherlock & Arnold.

For the first five months of the year low and medium priced car registrations aggregated 36,128 as against 27,491 for the corresponding period in 1922 and 15,564 in 1921. In the higher priced field registrations for the period reached 3648 as compared with 3011 in 1922 and 1996 in 1921.

In the low and medium priced field two cars are well in the lead for the five months period with registrations in excess of 5000 while three are above the 3000 mark and three others above 1000. Of the remainder, eight show registrations greater than 500.

One car in the higher priced field has in excess of 1000 registrations to its credit, another is above the 800 mark and six surpass 100.

Recapitulation by months for this year is as follows:

	Medium & Higher Low Priced Priced
January	2,814 201
February	2,801 580
March	8,102 769
April	11,124 1,106
May	11,287 992
Total	36,128 3,648

### Strattan Plans Early Production—Sells Monroe

INDIANAPOLIS, June 18.—Strattan Motors Corp. has sold its interest in the Monroe car which it proposed to manufacture along with the Strattan, it became known here today. The new owners of the Monroe, whose identity was not disclosed, are said to be planning production of this car on a substantial scale.

Frank S. Strattan, president of the Strattan corporation, said the Monroe property was sold because his company had decided to concentrate on the production of only one car—the Strattan, which has been announced at the price of \$695.

He said that production of the Strattan would be pushed rapidly and that an output of 50 cars a day was planned.

### ATLANTA DEALERS' MEETING

ATLANTA, Ga., June 16—Annual meeting of the Atlanta Automobile Association, which includes more than 90 per cent of the accessory and equipment, tire and automobile dealers in Atlanta in its membership, will be held Thursday night, June 21.

## New Head of Speedway Says Race Will Not Be Abandoned

**James A. Allison Succeeds Carl G. Fisher as President of Indianapolis Motor Track**

INDIANAPOLIS, June 16—Carl G. Fisher has resigned as president of the Indianapolis Motor Speedway Co., and James A. Allison, owner of the controlling interest in the big track since 1917 and former treasurer, has succeeded him, this action being taken at a special meeting of the board of directors this week, when Fisher's resignation was accepted.

In making the announcement of the change in officers, Allison said that the 1924 race will be held May 30 in the usual way, with the usual cash prizes of \$50,000, and that there is no thought at this time of abandoning the speedway plant or the race. Interest appears keener than ever, said Allison, as evidenced by the fact that there now are on file in the speedway offices the entries of nine cars for the 1924 race. The cars entered are the teams of the H. C. S. and Packard Specials, one Durant Special and a 91.5 cubic inch car to be built by Harry Miller.

Arthur C. Newby has been elected vice president of the Speedway company and the former secretary, Theodore E. Myers, has been made secretary-treasurer.

Explaining the resignation of Fisher, Allison said that Fisher now lives in Miami during the winter and recently purchased an estate in Long Island, where he expects to spend the remainder of the year. In view of these arrangements it would be impossible for him to devote the necessary time to speedway interests that the president should.

Fisher, Allison, Newby and the late Frank H. Wheeler built the speedway in 1909 and Allison acquired the controlling interest when he acquired the shares of Frank H. Wheeler in 1917.

The meeting proposed by Fisher between speedway and automotive leaders will not be held, according to one speedway official.

### WHEEL PLANTS AT CAPACITY

DETROIT, June 16—Motor Wheel Corp. sales in the first five months of this year were 80 per cent greater than the same period last year, and equalled 70 per cent of the total business in all of 1922. Orders on hand and business in prospect indicated a continuance of approximately present production during the rest of the year, according to C. C. Carlton, secretary. The acquisition of Disteel and Forsythe in the past few months is declared responsible for the increased business only to a definite extent. All plants are at capacity.

### M. A. M. A. TO MEET IN BOSTON

NEW YORK, June 16—The Motor and Accessory Manufacturers' Association has decided to hold its fall meeting, which is featured by its credit conference, in Boston the week of Sept. 19.

The program is now being arranged and so far two topics for discussion have been put on the card. One of these is the question of service for the consumer's benefit and the other is the possible restriction of the automobile market because of traffic conditions, a peril which has been pointed out by Alvan Macauley, president of the Packard Motor Car Co., in his article on "The New Saturation Point," published in *Automotive Industries* in the issue of June 7.

## Iowa Soldiers' Bonus Aids Low Priced Automobile Sales

DAVENPORT, Ia., June 16—Two factors in Iowa's financial status were reflected in automobile agencies reports this week and explained in a measure the encouraging June sales trend which is a combination of the unusual spring business.

The first one—notable primarily in dealers of the medium priced models—was the payment of the Iowa bonus. Thousands of checks for sums ranging from \$100 to \$350 have gone out to ex-service men. The bonus payments are coming in at a time when the post-war depression has been ended and the men are getting on their feet again.

The second and a broader financial circumstance is the report of Frank Warner, secretary of the Iowa Banker's association, that indebtedness of the state banks to the Federal Reserve and the War Finance corporation, which reached over \$100,000,000, has been reduced in two and a half years to nearly \$20,000,000. The source of the flow of prosperity which has hastened the liquidation has been the small-town bank, which means that the farmer has cleared his obligations, and is once more a prospective buyer.

## Title Registration Required of All Owners by Ohio Law

COLUMBUS, O., June 18—All automobile owners in Ohio who have not previously done so must file a sworn statement of ownership with the clerk of the court after July 26, when amendments to the Atwood Automobile Anti-Theft Law passed at the recent session of the legislature becomes effective. The Ohio State Automobile Association which was responsible for the enactment of the law originally, also secured passage of the amendments, that no doubt might remain as to who should file such statements.

### PREMIER STARTS CAB DELIVERY

INDIANAPOLIS, June 19—Premier Motor, Inc., the newly reorganized Premier concern, expects to begin deliveries of its new taxicab early in July, and in a few days will have an increased force to turn out the cars. The taxicab employs a Buda engine, and Millspaugh and Irish, body builders of this city, have the body contract for the taxicabs. The five year contract held by the Premier with a New York Taxicab concern calls for 1000 vehicles the first year, and a 10 per cent increase each year thereafter.

## New President of Texas Dealers



JOHN E. MORRISS

*At the recent annual convention of the Texas Automotive Dealers' Association at Corpus Christi, John E. Morriss of Dallas, was elected president. Morriss is proprietor of one of the leading authorized Ford sales and service establishments in his city. For a number of years he has been a leader in the trade in his state.*

### OUTINGS NOW IN ORDER

CINCINNATI, June 18—First outing of the year of the Cincinnati Automotive Trades Association will be held at Edgewater Club, a local amusement resort, June 21, John J. Behle, manager, announces.

The association has decided to hold its annual Fall Automobile Accessory and Radio Show in Music Hall, as formerly. The date of the event has not yet been definitely decided.

A committee from this association, composed of Charles H. Herrmann, A. J. Steidl and Robert J. Renner, has been appointed to act with the Cincinnati Safety Department, as well as the City Vigilance Committee, to reduce hazards created by reckless driving, speeding and other traffic law violations.

### JUNE BOOMS IN EAST

SPRINGFIELD, Mass., June 16—Car sales for this month opened strong in this district, continuing the momentum attained in April and May and reflecting little of the slowing down reported in many lines of business. The general verdict of dealers is that the first half of the year registers a decided increase of the number of sales over the corresponding period of 1922, the only exception being in the case of one or two high-priced cars. A feeling of confidence prevails and one of the best features is freedom of congestion in used cars.

## Unparalleled Expansion Marks 20th Year of Ford Motor Co.'s Corporate Existence

Company Has Produced 7,750,000 Cars and Trucks and Output This Year Will Be About 1,500,000; Greatest Prosperity in Its History

DETROIT, June 16—Ford Motor Co. is 20 years old today. Its birthday finds it enjoying the greatest prosperity in its history and carrying out an expansion program of great magnitude. Since its incorporation on June 16, 1903, the company has built more than 7,750,000 cars and trucks, and will build this year about 1,500,000.

Facts recalled by the anniversary of the company show that its capital originally subscribed was \$100,000 of which only \$28,000 was in cash paid into the treasury. Among the 12 stockholders with the company at the start Henry Ford held 25 per cent of the stock. In 1907 Ford acquired additional stock sufficient to bring his holdings to 58½ per cent. When Edsel Ford became president in 1919 he bought the remaining 41½ per cent outstanding and the company was reorganized July 9, that year, with authorized capital of \$100,000,000.

The first car manufactured by the company was on the road in June, 1903, and was sold the early part of July. In the first 12 months the company built 1708 cars. In 1908 the first model T was placed on the market. In 1913 the \$5 minimum wage was inaugurated in the plants together with profit sharing plan. Prices set last year are the lowest in the company's history.

Summarizing the extent of the company today shows two main plants here

with other manufacturing units at Hamilton, O., Northville, Mich., Troy, N. Y., and Iron Mountain, Mich. The company controlled its own coal supply with mines in West Virginia and Kentucky, and iron mines and timber land in northern Michigan. The company has glass plants at Glassmere, Pa., at the Highland Park plant and is building one at River Rouge. It is building also a \$1,200,000 engineering laboratory at Dearborn.

There are 34 branches of Ford in the United States of which 28 are for assembly. There are about 9000 dealers and about 15,000 authorized service stations making 24,000 points of contact. Foreign branches and associated companies are at Manchester, England; Copenhagen, Antwerp, Buenor Aires, Sao Paulo, Montevideo, Havana, Barcelona, Bordeaux and Trieste. There is also a manufacturing plant at Cork. Ford Motor Co. of Canada, Ltd., has an output of 75,000 cars yearly.

The first tractor was brought out in 1917 during which year 254 were sold. Present production is about 500 daily. The Lincoln plant was acquired in 1922 and is now a division of the company with annual capacity for 10,500 cars. The Ford railroad, the Detroit, Toledo and Ironton, connects with practically every trans-continental line.

facturers and jobbers and their families at the Balsams hotel, Dixville Notch, N. H., from June 25 to July 1. General sessions will be held Wednesday, Thursday and Friday of convention week and group sessions of the manufacturers and jobbers will be held separately on Wednesday.

The convention will hear a report of progress of the merchandising campaign, inaugurated two years ago at Mackinac Island. A. R. Mogee, now in charge of the work, will present a detailed report.

### FORD GETS LICENSE FOR DAM

WASHINGTON, June 14—Authority has been given by the Federal Power Commission to the Ford Motor Co., of Detroit, to construct a power plant at High Dam, near St. Paul, Minn. The license was signed and Ford is required to begin construction of the plant Sept. 1, 1923, completing it July 1, 1925.

The privilege is given for a 50-year period with an annual payment of \$95,440 to the United States Government. The Ford Motor Co. has advised the Commission that they will undertake the work immediately and a factory will be built near the power site.

## Hupp Shipments Pass Half of Year's Schedule; 4327 in May

DETROIT, June 15—Hupp Motor Car Co., shipments in May were 4327, for the fifth consecutive month exceeding shipments for any similar month. Incomplete reports from distributors and dealers throughout the country indicate, according to O. C. Hutchinson, general sales manager, that the month was also the greatest sales month the organization has enjoyed.

Shipments in the first five months of the year are reported at 20,998, more than half of the 40,000 production schedule set for the year. Shipments ending May 31 were 52 per cent ahead of the same period in 1922, and May was 18 per cent better than May a year ago. June orders are in excess of production possibilities despite the 40 per cent curtailment advised.

### MANY TO ATTEND A. E. A. MEET

CHICAGO. June 20—The summer meeting of the Automotive Equipment Association is expected to prompt an assemblage of five or six hundred manu-

## Stockholders Organizing New Company For Templar

Seek \$2,500,000 New Capital to Put Company Now in Receivership On Its Feet

CLEVELAND, June 16—Stockholders of the Templar Motors Co., of Cleveland, for which a receiver was appointed several months ago, are forming an entirely new corporation to acquire the assets controlled by the Templar Syndicate and again enter actively into the field of motor car manufacturing.

Details of the reorganization are being handled exclusively by the Templar stockholders, who have formed a re-organization committee composed of about 25 leading stockholders. In their opinion the general business conditions, and those in the automobile industry in particular, are ripe at this time to insure the successful completion of their plans to restore the production, distribution and sale of Templar cars to normal.

The Templar factory has never ceased active operation. Despite the curtailing of its regular production it has been operated daily by the receiver at a satisfactory profit.

It is understood that the proposed new corporation will offer its present stockholders \$2,500,000 of 7 per cent preferred stock at \$50 a share. All the money thus obtained will be used solely for working capital to carry on the manufacture and sale of Templar cars in volume.

### TAXICABS GET IN SHOWS

NEW YORK, June 16—The taxicab is a passenger vehicle according to the decision of the National Automobile Chamber of Commerce and as such is entitled to space in the National shows at New York and Chicago. Therefore announcement is made by the big organization that a taxicab division will be part of the annual displays of automotive products next winter, the first time recognition has been given this busy member of the automobile family in the National shows.

### DODGE SERVICE MEN MEET

ATLANTA, Ga., June 17—About 100 vice managers for Dodge Brothers dealers in Georgia and Tennessee attended a service school held in the station of F. E. Maffett, Inc., Dodge Brothers distributor in Atlanta, in May. D. A. Carson, district representative of the Detroit company, and T. H. Wade, of the Dodge Brothers factory, were in charge of the school, which included an intensive three-day course.

### ATLANTA DEALERS PLAN OUTING

ATLANTA, Ga., June 16—Preparations are under way for holding in Atlanta the latter part of June, the annual summer outing of the Atlanta Automobile Association, membership of which includes more than 90 per cent of the automobile, accessory and equipment dealers in the city. The outing will be at the Brookhaven Country club, the date to be selected later.

## BUSINESS NOTES

At a meeting of the stockholders of the Lee Rubber & Tire Co., an increase in the capital stock from 150,000 shares no par value to 300,000 shares was authorized. Only 65,000 shares of the new stock will be issued. The purchase of the Republic Rubber Co. by the Lee Rubber & Tire Co. was approved. The new 65,000 shares will be issued in payment for the Republic Rubber Co., of Youngstown, O.

The Southern Auto and Wagon Co. has moved into its new plant at Charlotte, N. C. The plant is located in one of the buildings erected at Camp Greene during the war and contains about 50,000 square feet of floor space.

The Auto Meter Sales Co. is the name of a corporation chartered by Isaac N. Whipps and others to distribute the vacuum gasoline meter in central Ohio. The place of business is located at Grant avenue and Long street, Columbus, and Isaac N. Whipps is general manager.

Reo Motor Co.'s branches at Detroit and Lansing have been incorporated as the Reo Michigan Sales, Inc., with a capital of \$25,000, all of which has been paid in cash. The incorporation is in line with the company's policy of incorporating all its branches, there now being 10 located at Los Angeles, Phoenix, Ariz., San Francisco, New York, New Rochelle and Brooklyn, Newark, N. J., Windsor, Ont., and the two Michigan branches.

The new concern that is to make automobile wheels of a composition of rubber and wood in Monson, Mass., has adopted the name of Rubwood Wheel, Inc. A dam is under construction and it is expected that the plant will be ready for installing of machinery by Aug. 1.

At a meeting held at the offices of the Rickenbacker Motor Co., Detroit, June 1, the directors authorized the payment of a two per cent cash dividend, payable, July 15, to all holders of fully paid up stock of record as of June 30.

The following Missouri automobile concerns have filed articles of incorporation with Secretary of State: Sweeney Tire Stores Co., St. Louis, Mo., \$20,000; Vitt Motor Co., Sedalia, Mo., \$2,000, to sell and repair motor vehicles and automobiles.

The Westinghouse Electric & Manufacturing Co., announces a plan whereby all employees may participate in the purchase of a new issue of 20,000 shares of common stock to be paid for on the deferred plan at \$53 a share (par value \$50). Each employee may subscribe for one to 20 shares of stock and pay for it in 10 consecutive monthly installments.

The American Gas Accumulator Co., of Elizabeth, N. J., which makes Traffic Beacons and Highway Lighthouses, has opened a New York office at 100 East 42nd street, in the new Pershing Square Building opposite the Grand Central Station.

Dalton & Balch, of Chicago, manufacturers of the D & B silent timing gears, announce the assignment of the Gibbes Machinery Co., of Columbia, S. C., and Harwick & Co., of Richmond, Va., as distributors for the D&B gears in their respective territories.

Manufacturers of Multibestos brake and clutch linings will keep "open house" at the factory of the Multibestos Co., Walpole, Mass., from June 18 to July 7 for those going to and from the mid-summer meeting of the Automotive Equipment Association, which will be held at Dixville Notch, N. H., June 25-July 1.

The Remy Electric Co., through its field representatives, United Motors Service, Inc., is supplying the trade with its more commonly used service parts packed in attractive boxes.

The three months' period, March, April and May, saw the largest spring production in the history of the Detroit Steel Products Co., manufacturer of motor car springs. The total production for this period ran approximately 550,000 springs—sufficient to equip 137,500 cars.

The Electric Steel Co., of Chicago, which makes a considerable amount of steel castings in the automotive field, has changed its title to the Nugent Steel Castings Co., and W. J. Nugent, formerly with the American Steel Foundries and the Ohio Steel Foundry Co., has been elected vice-president and general manager. Other officers are: President, Charles Pie; treasurer, Prentiss L. Coonley; secretary, C. A. McDonald.

and motor vehicles that can be secured, it even being planned to have a historic ox cart in the line march and display.

From the highways and by-ways of this section of this country will be brought forth both ancient and modern means of transportation, including the ancient stagecoach and the modern jitney bus. In the motor section will be found cars dating back more than a score of years, some of them vehicles that were largely experimental, yet able at this date to travel under their own power. Automobiles showing the advance in motor construction will be shown, and one-cylindered cars will rival their more modern successors.

## FORD WANTS TEXTILE PLANT

ATLANTA, Ga., June 16—According to information obtained by textile plant engineers in Atlanta, the Ford Motor Co. is seriously considering the establishment in the southeastern field of an enormous plant to be used for the production of cotton drill used in Ford cars. The plant, it is said, will cost around \$25,000,000, and contain approximately 300,000 spindles. This would make it the largest cotton mill in the South.

## 27 FORD DEALERS MEET

FORT SMITH, Ark., June 18—Twenty-seven Ford dealers in Western Arkansas had a conference in Ft. Smith on the weekly payment plan. C. M. Alexander, manager of the Memphis branch, attended.

## 475 Prizes For Children in Safety Essay Contest

## N. A. C. C. Gives \$6,500 to Help Promote Teaching of Caution in Schools

NEW YORK, June 16—The National Automobile Chamber of Commerce has appropriated \$6500 to be used as prize money in the third annual Safety Essay contest promoted by the Highway Education Board of Washington, bringing the N. A. C. C.'s contribution up to \$12,000. To this is added \$3000 by the Highway Education Board, it having been found that it will require about \$8500 to promote the contest, which is designed to arouse the children of the country to the need of caution when using the highways.

There will be 475 prizes for children of the grammar school age for the best essays on safety. The prizes being prorated among the States according to their school population. There will be three first prizes—a gold watch and a trip to Washington for the children; a \$500 cash prize open to teachers and a third for the best essay on rural highway safety, which will be awarded by the National Grange Master's office at Fredonia, N. Y., the prize for which will be a trip to Washington.

Representing the N. A. C. C. in this is E. S. Jordan, who has been chosen as the special representative of traffic and safety. Full information on the subject, which always creates nation-wide interest among manufacturers and dealers, may be had from the Highway Education Board, Washington, D. C.

## DEALER SUES DISTRIBUTOR

JEFFERSON CITY, Mo., June 16—R. R. Armstrong and William E. Wentzelman, under the firm name of the Blatz Distributing Co., have filed suit in the circuit court against the DeLuxe Automobile Co., distributor of the Oldsmobile in Jefferson City and territory, for \$3,040, alleged to be due them as commission on the sale of six automobiles. The Bryant Garage has been selling the Oldsmobile, but attorneys for the complainants charge that the DeLuxe company did not cancel the contract with Armstrong and Wentzelman before entering into a new contract with the Bryant Garage.

## SUNDAY CLOSING DEBATED

TOLEDO, June 16—Members of the Toledo Automotive Trades Association now have before them a questionnaire which asks their opinion about closing sales and service stations on Sunday. The questionnaire was sent out on demand of a number of the dealer members who believe that the automobile sales and service business should be placed on the same basis with other business and also that salesmanship will be more effective if Sunday is made a day of rest for all.

## Motor Interests Hold Up Massachusetts Gasoline Tax

BOSTON, June 18—Massachusetts passed the law putting a two-cent tax on gasoline. But the law may never go on the statute books. A referendum to the people will hold it up for a year at least, and if it is not approved the law is a dead one.

Immediately after the bill was signed a referendum petition was filed with the Secretary of State. Then the request was put in for blanks. Later there was a meeting of men from all the motor associations to plan the fight. They had 4000 blanks each of which may hold 50 names.

It is necessary to get 15,000 names in at least four counties in the State. The committee plans to get many more than that number, securing names in all counties. Then they will start their campaign against the bill. The referendum will have to be passed upon at the election a year from next fall so that the money expected from the tax will not be available anyway for a couple of years.

## SHOWS PROGRESS OF VEHICLES

PUTNAM, Conn., June 16—More than ordinary interest in automotive circles is being taken in the proposed vehicular pageant being arranged by Putnam Chamber of Commerce and Secretary A. F. Ralston for this summer, the date yet to be determined. Included in the pageant will be all types of horse-drawn

## CONCERNING MEN YOU KNOW

Albert C. Bruce, formerly vice-president and general manager of the American Hammered Piston Ring Co., has been appointed president, succeeding C. F. Hockley, whose duties as vice-president of the Bartlett-Hayward Co.—the parent company of the American Hammered Piston Ring Co.—require practically his entire time. Hockley will continue as chairman of the board of directors of the piston ring company. W. C. Stettinus, sales manager of the equipment division, has been made first vice-president and general manager. Thomas B. Blakiston, in addition to serving as general sales manager of the replacement division, has been appointed vice-president. Joseph S. Jacobs, former secretary and assistant treasurer, has resigned to associate himself with the Bartlett-Hayward Co. as sales engineer in the gas division.

E. J. Bryant has been placed in charge of the gage department of the Greenfield Tap & Die Corp. Previously he had been associated with the Taft-Pierce Manufacturing Co. and the Brown & Sharpe Manufacturing Co.

A. Conro Fiero has been appointed managing director of the White Co., Ltd., at Toronto. He was formerly located at Johannesburg where he was divisional manager for Africa of the export department of the White company. He succeeds Morse Fellers who resigned. Thomas B. Finnigan has been appointed manager of wholesale distribution for the Canadian plant at Toronto and will devote his efforts to the development of a comprehensive dealer organization.

L. M. Van Riper has been appointed vice-president in charge of sales of the Racine Rubber Co. of Racine, Wis. At the same time it is announced that the company's general sales offices have been moved from Racine to 222 West 57th street, New York City, where Van Riper will have his headquarters. Van Riper has been general sales manager of the company for about a year.

G. W. Brogan, assistant to the president and advertising manager of the Black & Decker Manufacturing Co., has organized G. W. Brogan, Inc., a new advertising agency which will become operative Jan. 1. Brogan will handle a selected list of related accounts, specializing in the merchandising and advertising of concerns interested in the servicing of automobiles, trucks and tractors. These accounts will be limited to six non-competing lines, one of which will be the Black & Decker Manufacturing Co.

Fred M. Hoblitt has been promoted from general sales manager to vice president in charge of sales of the Ajax Rubber Co., continuing his headquarters at 220 West 57th street, New York City.

Fred H. Lord, of the advertising department of the Cadillac Motor Car Co., was tendered a farewell dinner by his co-workers and friends at the Hotel Wolverine, Detroit, recently. After a short vacation he will take up his new duties in the copy department of the Campbell-Ewald Co.

### Vesper Heads Committee to Greet Harding in St. Louis

ST. LOUIS, June 15—F. W. A. Vesper, president of the Vesper Buick Automobile Co. and president of the St. Louis Chamber of Commerce, has been appointed chairman of the Reception Committee which will work out the details of the visit of President Harding to St. Louis, June 21. The appointment of Vesper was made by Mayor Henry W. Kiel.

Other automobile men on the reception committee are Col. Phil. H. Brockman, Henry F. Fahrenkrog and Frank R. Tate.

### PIONEER BODY BUILDER RETIRES

ST. LOUIS, June 15—James H. McCabe, one of the founders of the McCabe Auto Body Co., 1215-21 North Broadway, announced to a gathering of the employes last week that he had withdrawn from active interest in the concern and that his holdings had been purchased by Edward J. Powers.

Robert E. Lee, secretary of the St.

W. E. Holler, brought from Flint, Mich., to New York City to become assistant to the president of Durant Motors, Inc., has been named as general manager of the Durant interests at Flint, effective July 1. In that position he will have full charge of the Flint Motor Co. and the Star Motor Co. Holler formerly was manager of the Flint Chamber of Commerce, following which he became general manager of the Imperial Wheel Co.

George Drake Smith has resigned as sales manager of the Steinmetz Electric Motor Car Corp. He will engage in the promotion and sale of investment securities in New York City.

H. E. Taylor, for the past three years sales manager of the Las-Stik Patch Mfg. Co. of Hamilton, O., has been appointed sales manager of the Farran-oid Co., Akron, O., manufacturer of Farran-oid fan belts and Farran-oid tube patch, and will take up his duties with them about June 15.

Theodore Weigle, pioneer in the tire branch of the automobile industry, died June 6 at Millersburg, O., where he was identified with the McKone Tire & Rubber Co. Mr. Weigle began work in the rubber trade as a clerk in the Cincinnati branch of the Diamond Rubber Co.

Karl B. Mickey has been appointed advertising manager of the Eaton Axle & Spring Co., Cleveland. He will make his headquarters at the Perfection Spring plant. He was formerly with the Sherwin Williams Company and the House of Hubbell, both of Cleveland.

Ivan S. Ryle, sales manager for the Dodge Motor Co. at Cheyenne, Wyo., and Miss Esther Marie Sherwood of Kirksville, Mo., were married last week at Greeley, Colo.

Saunders Jones, who has been manager for the St. Louis branch of the White Co. at 4151 Forest Park boulevard since last September, has been elected vice-president of the company in charge of the western region with headquarters at St. Louis. Eugene Kelly, formerly manager of the New Orleans branch, arrived in St. Louis last week to succeed Mr. Jones as local manager.

L. H. Schultz, for the past fourteen months with the Bureau of Foreign and Domestic Commerce of the Department of Commerce as assistant to the chief of the automotive division, has resigned to take up work in the export department of the Yellow Cab Manufacturing Co., of Chicago, in September. In the meantime he will make a trip to Spain to report on merchandising and servicing conditions for the automotive industry.

Ross Hopkins, formerly in the wholesale division of the Klaxon Horn Co., of Detroit, is now sales manager for Phal & Bitter Machine Co., of Toledo, manufacturer of a windshield spotlight.

Col. Fred Cardway has been made manager of the export department of the Peerless Motor Car Co. He was formerly manager of the Packard Motors Export Corp.

Louis Automobile Dealers' Ass'n, presented to McCabe a silver loving cup and matched candle sticks on behalf of the employes. The firm was founded more than 50 years ago by McCabe as McCabe-Young Co.

### OLDS DEALERS GET PRIZES

LANSING, Mich., June 16—As a result of test made during its recent Oldsmobile National Hill Climb week, Olds Motor Works has awarded large silver trophy cups as grand prizes to Lathrop-McFarland Co., Indianapolis distributor, and to the J. W. Levitt Co., distributor for the state of California. Second prize, a silver cup, was awarded to Oldsmobile Sales Co., Washington, D. C., and third prize, also a silver cup, went to G. W. Henner, dealer at Rochester, N. Y. Other given honorable mention were: Simmons Motor Car Co., Cleveland; De-Lux Automobile Co., St. Louis; Spain-Skinner Co., Denver; A. H. Carpenter Motor Co., Centralia, Wash., and the Olds Motor Works, Michigan Branch, Lansing, Mich.

## Chrysler Announces He Is Exclusively With Maxwell

### Has Increased Holdings in Company, Following Three Years of Successful Management

DETROIT, June 16—Official announcement has been made by Walter P. Chrysler that he has largely increased his holding in the Maxwell Motor Corp. and that he will be permanently and exclusively associated with the corporation from this time forward. Until now Chrysler has been associated in other activities from time to time, his most recent active connection being as executive vice-president of Willys-Overland. The announcement this week places him definitely with Maxwell.

Three years ago he was retained following his successful working out of the reorganization of the company, as chairman of the board of directors and also chairman of the executive committee. At that time he was also identified with Willys actively and did not enter into an exclusive agreement or agree to permanent association. He has maintained offices in New York and as consultant and advisor in motor car matters he has been much sought by financial houses.

Present models of the Maxwell and Chalmers line, which have made the company one of the foremost in the industry, were developed under his direction. Dating from these the company's product has enjoyed striking popularity and this with economies effected in the plants, has placed the company in strong financial position. Its recent statement showing a paying off of approximately \$8,000,000 in notes in two years reflects this.

### TRUCK CO. ELECTS OFFICERS

GALESBURG, Ill., June 16—At the annual meeting here of the stockholders of the Dependable Truck and Tractor Co., C. V. Morse and A. R. Knox, both of Galesburg, were chosen directors for three years. The board then elected the following officers: President, C. V. Morse; vice-president, A. E. Patchin; secretary-treasurer, A. R. Knox. Reports of the year's operations showed a satisfactory gain in the output as compared to the preceding year and with orders enough on file to assure a steady operation in the year to come.

### BUSES UNDER UTILITY LAW

COLUMBUS, O., June 18—The rapid growth of motor buses as a means of transporting passengers and freight will come home to the Ohio public utilities commission this summer. The newly amended law which places control of this utility under the commission becomes effective July 27, and hundreds of bus companies throughout the state must come in for certificate of authority to operate in Ohio and to file liability insurance bonds.

## IN THE RETAIL FIELD

A new Nash automobile agency has just been opened in the C. S. Brown Garage, Marshall, Mo., under the management of Mr. Pinkepank, formerly of Sweet Springs. The new management also has sales rooms at Sweet Springs and Concordia, and Saline county recently was allotted as its territory.

The Cole Motor Car Co., of Indianapolis, announces the appointment of the following as distributors of the Cole in their respective territories: Beach Mfg. Co., Montrose, Pa.; Wood County Auto Co., Parkersburg, W. Va.; S. L. Bradley & Son, Princeton, Ill., and the Gray Motor Sales Co., Sanford, Fla.

J. N. Moxley, of the Moxley Motor Car Co., 1215 Main street, Little Rock, Ark., announces that his company has become the distributor in the Little Rock territory for the Stearns-Knight.

Ward-Groff Motor Co., Cleveland distributor in St. Louis, has appointed Ceranski's garage in Dubois, Ill., as dealer for the Cleveland.

The Tate Motor Co., distributor of the Dodge car in St. Louis, has purchased a plot of ground at Garrison and Washington avenues. This purchase gives the Tate Co. a combined frontage of 165 ft. on Washington avenue with a depth of 125 ft. on Garrison avenue. Frank R. Tate, president of the concern, said it is the intention of the company to erect a three-story modern automobile building on the property, the plans for which are now in the preparatory stage.

The Winton-Foster Co. has been organized at St. Louis, Mo., with F. J. Foster as president, to handle the Winton car. The new company will have quarters at 2914-16 Washington boulevard. Foster has been connected with the Winton line for four years. Walter Kull, who has for some time been in the service end of the business with Winton cars, will be in charge of this department.

James Melody, Tuscola, Ill., has purchased the Jeffers & Goodman garage and sales agency in that city. He will continue the distribution of the Chevrolet car. Melody owns a half interest in the Ford agency at Arcola, Ill., his brother being his partner.

The Miller-Toher Auto Co. has occupied its new and commodious sales and service rooms at 518-520 Harrison street, Davenport, Ia. The agency handles the Cleveland cars exclusively. Frank Siegfried has been placed in charge of the new service department.

The Milwaukee branch of the Buick Motor Co. announces the opening of the Northwest Buick Co., the eighth Buick sales service establishment in Milwaukee county. Ray W. Cleary, president of the Northwest Buick Co., has been actively engaged in the sales and service of Buick motor cars for the last 16 years. He was director of sales in the Chicago branch, and more recently retail sales manager of the Milwaukee branch. The Northwest Buick Co. will be quartered temporarily at 1071 29th street near Fond du Lac avenue, pending the erection of a suitable building.

Kelly's Garage, 12 North Brevard street, Charlotte, N. C., has been appointed an authorized associate dealer by the Charlotte Motor Car Co., Hupmobile distributor.

The Heidelberg Auto Co., of Jackson, Miss., has been named distributor for the Olds Motor Works, of Lansing, Mich., in that section. The Oldsmobile Sales Co., of Little Rock, Ark., has also been appointed distributor in that territory.

C. J. Holmqvist, Kewanee, Ill., has taken local agency for the Kissel car and will have his office at 518 East Second street. He has been with the Parkside garage three years.

The Nichols Bros. have taken over the A. J. Hartman garage, 800 Osborn street, Burlington, Iowa, and announce that they will continue its operation. A used car department is to be added.

Charles H. Barritt, who for some time has operated a service and repair shop in Pittsfield, Mass., has taken the agency for the Kissel truck.

Harry E. Fogel and S. W. Timson, Freeport, Ill., have purchased the Black Hawk garage, Oregon, Ill., from W. T. Davis and will continue its operation. They will also handle the Star and Durant cars in this territory.

The Awerkamp garage, 908 Hampshire street, Quincy, Ill., was destroyed by fire June 3 with a loss of \$10,000.

The Mack Motor Truck Co. has awarded a contract for a large building to accommodate its Springfield (Mass.) branch, the location being on the main thoroughfare, with ample provision for future expansion. Work is being hastened with a view to occupying the building in August.

E. L. Hendry, formerly president and manager of the Blue Ribbon Motor Sales, Inc., and more recently with the Springfield Automobile Co., has taken the garage recently conducted by the Hampden Motor Co., and will operate it as a service and repair shop and used car sales place.

E. K. Hyder, formerly connected with the Tenth St. Garage in Springfield, Mass., has opened an automobile repair shop in Patton street in that city.

E. J. Donovan, Hudson-Essex agent in Great Barrington, Mass., has just opened a new salesroom and service station. Joseph D. Wheaton, for the past two years with P. D. Powers, Inc., in North Adams, has been put in charge of the service department.

The Deely Motor Co. has succeeded Deely & Smith as Gray dealers in Pittsfield, Mass.

E. V. Johnson, Rockford, Ill., has been appointed distributor for the Stewart line of trucks in Winnebago and adjacent counties of northern Illinois, and will maintain his agency and service station at 713 South Fifth street.

Walter Rollins has been appointed sub-dealer in Suffield, Conn., for J. S. Harrington, Inc., Hudson and Essex distributor, Springfield, Mass.

Willet Garage in Ware, Mass., has been authorized to sell the Buick as sub-dealer for the Springfield Buick Co.

A. R. Carver of Granby, Mass., has been designated to sell the Hupmobile in Granby and Ludlow City. The agency was placed through the Leonard Motor Co. of Springfield.

C. C. Moore, Westfield, Mass., has taken the agency for the Hupmobile from the Leonard Motor Co., Springfield, in addition to his Reo business.

The Broadway Auto Supply Co. has opened a tire accessory store in Springfield, Mass., under the management of Frank Goyette.

The Acree Motor Co., dealer for Nash Cars in Montgomery, Ala., has recently moved into new quarters at 108 North Royal street.

The Alemite Lubricator Co. of Alabama, headquarters in Birmingham, has announced that a branch of this concern will be opened in Montgomery, Ala., and will be operated on the same plan as the Birmingham plant.

J. H. Holcomb, Jr., president of the Garth-Holcomb Motor Co., Studebaker distributors of Birmingham, has recently purchased the entire interests of W. F. Garth in this concern and the name of the concern has been changed to the Holcomb Motor Co., Inc. Holcomb is president and general manager of the new concern.

The Sottille-Chevrolet Co., of Charleston, S. C., has been organized and incorporated with \$15,000 capital, and will act as distributors of the Chevrolet car in that section of South Carolina. Santo Sottille, of Charleston, is president of the new company, and Albert Sottille is secretary.

C. A. Verlin, an automobile salesman in Atlanta for several years, has been named retail sales manager for the Atlanta branch of the Oakland Motor Co. Verlin was formerly manager of the wholesale department of the Thompson-Cauthorn Motor Co., Hupmobile distributors in Atlanta.

George La Roache has been appointed sub-dealer in Holyoke, Mass., for the Columbia Springfield Co., distributors of the Columbia Light Six.

A. V. Reopell, Chevrolet dealer in Springfield, Mass., will open his new building for sales and service soon after July 1. This will afford him one of the most attractive showrooms in the city for new cars, entirely distinct from the used car and service departments.

The F. G. Parker Co., Studebaker distributor, Springfield, Mass., has appointed these sub-dealers: Melrose S. Paige, Amherst, Mass.; Frank Como, Ware, Mass.; P. T. Lally, Windsor Locks, Conn.

Two new distributors for the Cleveland automobile are C. C. Brown, 133 West Church street, Marion, O., and Tye Auto Supply Co., Inc., Mount Carmel, Pa.

The Republic Truck Sales Co. of 1717 Oak street has taken over the distribution of the Republic trucks in Kansas City, Mo. J. A. Keating, who was in charge of the Republic Motor Truck Co.'s branch, is general manager of the new firm.

McDavid Brothers, Excelsior Springs, Mo., have completed arrangements to move their automobile business to the Silvers Garage on Thompson avenue, where they have rented a part of the building as salesroom and space in the basement for their service cars.

The Meeks Motor Co., of Gadsden, Ala., according to an announcement by W. C. Meeks, head of the company, will construct this summer a \$10,000 building at Gadsden, to be used as a service station and show room.

The W. M. Thompson Motor Co., of Greenville, S. C., is building a service station and sales building at Washington and Spring streets, at an estimated cost of about \$150,000, and will occupy the building this summer.

The Hall-Anderson Motor Co. is a new concern at Greensboro, N. C. They will sell Anderson cars and operate a service station.

The Sain Motor Co., Lincolnton, N. C., has secured the agency for the Durant and Star cars.

O. L. Bromley, 845 North Van Dyke street, Decatur, Ill., has taken the agency for the Elcar.

Gary Nash Sales Co. has been organized to sell Nash cars at 529 Washington street, Gary, Ind. H. W. Bartholemew is president, John W. Lyddick is vice-president, and J. O. Butler is secretary and treasurer.

The Kohler-Speer Motor Car Co., 5033 Delmar boulevard, St. Louis, has changed the name of the firm to the Kohler Motor Co. The company handles the Studebaker car.

The Peru Motor Co., 912 Peoria street, Peru, Ill., has been appointed dealer for the Auburn car.

Hyatt Motor Co., of Asheville, N. C., has been appointed distributor for Western North Carolina for the Jordan car, in addition to the Peerless, which the company has represented since organization in February.

The E. J. Bailey Motor Co. has been organized at Pittsburgh, Pa., by E. J. Bailey, B. G. Schaefer and Amy G. Bailey.

The Greater Pittsburgh Tire Dealers' Association, recently organized at Pittsburgh, Pa., to protect the interests of tire dealers and perfect a credit system whereby dealers will suffer a minimum of losses, has decided to incorporate as a business concern for profit.

The Rosman Automobile Co., Sioux City, Ia., dealer in Overland and Willys-Knight cars, has moved from its Sixth street location to larger quarters at 610 Nebraska street.

The Bryant Motor Co., Centerville, Ia., has taken the Chevrolet contract for that territory.

The S. & E. Chevrolet Sales Co., of Ottumwa, Ia., is the name of a firm recently organized to handle Chevrolet cars in that territory.

The Lexington (Kentucky) Cadillac Co., distributor, has secured a franchise to act as central Kentucky distributor for Oakland automobiles.

The United Motors, Incorporated, of Louisville, for many years state distributor of Hupmobile cars, has opened a branch office and salesroom at 234 East Main street, Lexington, Ky. The central Kentucky business will be handled in the future through the Lexington office. James Headley, formerly of Lexington, but for several years southern states representative for the Hupmobile company, will be in charge of the Lexington branch, assisted by Robert R. Estill.

Fire caused by burning gasoline ignited by an acetylene torch damaged nine automobiles and caused a total loss of more than \$3000 at the Rulman Auto Co., Seventh and Charles streets, St. Joseph, Mo. Practically all of the damage was covered by insurance. Six cars in the room next to where the fire started were saved.

Forrest E. E. Erhardt and Arthur F. Fischer have sold their interest in the St. Mary's Boulevard Garage on St. Mary's boulevard, Jefferson City, Mo., to J. W. Box, of Bonnots Mill.

The building at 420 So. Robberson avenue, Springfield, Mo., which had been occupied by the John B. Cox Body & Fender Works, has been taken over by the John W. Miller Tire Co. Cox recently became associated with the Duemler & Crump Co., which is erecting a modern automobile shop on West Walnut street.

Horst & Strieter, Davenport, Ia., agents for the Ford, have purchased the two-acre plant of the Davenport Can Co. for \$40,000 and will establish an assembly, welding and radiator repair department there. The factory has 100,000 sq. ft. floor space. The company last year reported it handled 2200 cars and indications are that this year there will be a 25 per cent increase in its business.

J. R. Rude and J. W. Dryden, formerly of the Rude Auto Co., Marshalltown, Ia., have secured the Ford contract at Baxter, Ia.

The Johnson & Laurence Auto Co., Fort Dodge, Ia., Studebaker dealer, is erecting a new garage building at Second avenue and Twelfth street.

The Lake Motor Car Co., Columbus, O., has been incorporated with a capital of \$100,000 after operating for about a year under the sole ownership of T. Bruce Adams. The company handles Earl and Anderson motor cars. The company has acquired a 10-year lease on a building about 2 squares north of where they are now located at 1044 N. High street.

# Steve, the Handy Man

His Bashful Nature Makes Him Hide His Shop  
Behind the Other Fellow's Sign

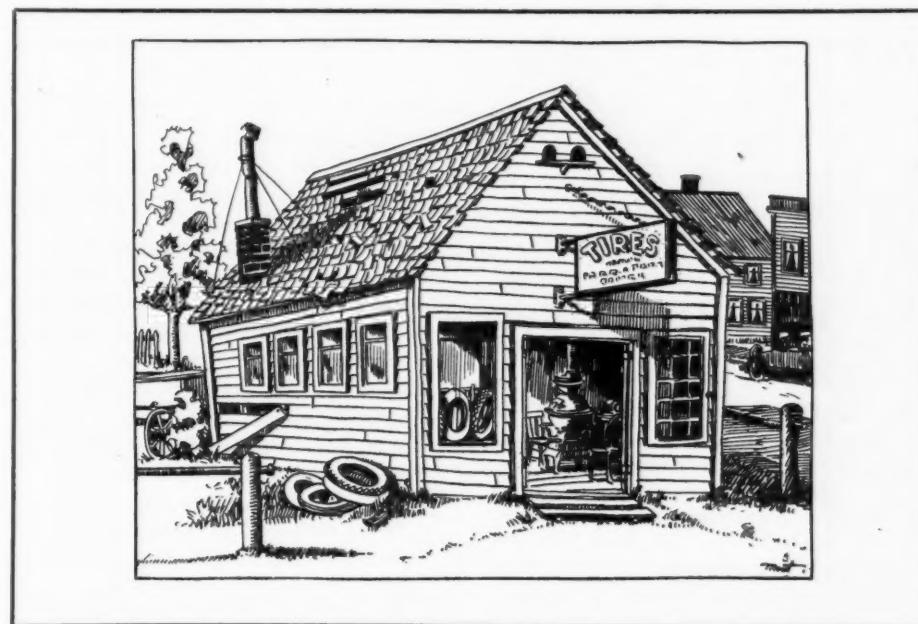
THEY all said Steve would be a great man, some day. Perhaps he will. Like all boys he found great delight in dissecting the old alarm clock, but unlike most of them he was sometimes able to get a few of the parts back again. He had an Ajax motor and a dry cell. He made flour mills out of oatmeal boxes, with spools for pulleys and string for belts. Steve certainly seemed to have a great future—ahead of him.

It was some years later when I again heard of Steve, the predictions seemed to be coming true. He was in the automobile business, so he said, in his letter, had his own shop and was doing fine. An electrical shop it was and he knew all about the gears and chains and dynamos and batteries and whatever things of that sort they put in the cars.

It was a few weeks after getting that letter from Steve that I had to make a business trip, and, as I intended to drive, I decided to take the wife along. Perhaps I did not function entirely alone in the decision. At any rate we went.

I knew from his description about where his shop was, and as we drove into town, I had my eyes open for a service station which would be in keeping with Steve's latent abilities which had been so much in evidence as a boy. Where his shop should have been was an establishment, evidently at one time a barn or horse shoeing shop, but I knew it for an automobile shop of some kind for there was a large tire sign, newly erected quite prominently displayed.

I didn't blame Steve for starting in a



Steve's electrical shop—but who would guess it?

small way, it's better than making a big splash and falling down on the job, but I wondered what had happened to the electrical business and whether it had all floated off to some other town or something had made him quit it and sell tires.

We found Steve sitting by the stove talking in friendly fashion to another man. He rose and greeted us, I introduced my wife, and Steve apologized for his appearance. He had on old overalls,

which was all right, for his work required it, but he also had on about a week's growth of dirty red whiskers, the necessity for which was not apparent.

I asked him about the tire sign and whether he had quit the electrical work. "Oh no," he said, "I still do electrical work but I rented out part of my shop to this man who sells tires and that's his sign." Then I asked how business was and he said that it had been good for a while but had fallen off lately.

So we talked awhile and then drove away and after we had cleared the town and were out on the open road again, my wife said, "He might have more business if he would shave every day, it's nothing to me, but if women ever come to his shop to have work done on their cars, there isn't much chance of their coming the second time. Even the woman that does our wash would rather buy soap from a good looking clerk at the grocery than from one who is careless about his appearance, and the same holds true in any line of business. Even if he does not expect any women in his place, he can make a better impression even on the farmers who drive in, for the appearance of success brings business."

There was no chance for argument. I felt the same way about Steve and I also wondered how he could sit there by the stove and talk about nothing in particular when he had so much work to do. Perhaps he had no battery work, but he could at least be putting up a sign to tell people that his tenant's work was not the only kind handled in that place.

Yes, Steve certainly has a great future ahead of him—quite far ahead.



Steve smiled at us from his ambush of a forest of second growth whiskers

# The READERS' CLEARING HOUSE

## Questions & Answers on Dealers' Problems

### Old Automobile Engine Not Very Good for Motor Boat

Q—We have an old Rambler 4 cylinder engine with cylinders cast separately and bore of 5 in. and stroke of 6 in. We do not know in what year it was made but think it was after 1914. We are considering remodeling it for a marine engine and would like to know its maximum h.p. and the r.p.m. at which it is obtained. It is to be installed in a racing hull and we need this information in selecting the propeller.—Renew Auto Co., Arkansas City, Ark.

Our first recommendation would be that you install a Marine engine or else a tractor or aviation engine. These are designed for continuous pulling while an automobile engine is not. The automobile engine is usually too light and the bearing surfaces are too small for continuous duty. It is intended for service where the car occasionally coasts and the full hp. of the engine is not required for long periods. On an engine of this kind in a motor boat you will have trouble due to the bearing surfaces being too small and the pistons being too heavy which will cause excessive vibration and will shake the engine to pieces if used continuously over a long period of time.

Answering your question however, to the best of our ability would say that we estimate the hp. at 40 at a speed of 1,000 r.p.m. but for fairly successful operation would recommend that you use not over 30 hp. at from 800 to 1,000 r.p.m. It might help some if you would install a constant clearance type of aluminum alloy piston as this would reduce the reciprocating weight and thereby reduce the inertia load on the bearings.

You will also doubtless find that the engine is not suitable for the fuel being used today and a hot-spot manifold of some kind may be required. Then you will possibly find that the valves are too small for best operation so that in summing up the whole situation you would do better to install a Marine engine or similar engine designed for continuous heavy duty.

### COILS BURN OUT ON ISOLATED LIGHTING PLANT

Q—We have a customer who has  $\frac{1}{2}$  K W 1921 Delco Light plant which was submerged under water a year ago. The power plant was overhauled and new coil installed. A month after it was put in operation the coil burned out when engine was running. On three occasions since the engine has been stopped by hand apparently in good condition but a few days later would not start until a new coil was installed, genuine coils being used on each occasion. We have never

### The Readers' Clearing House

THIS department is conducted to assist dealers and maintenance station executives in the solution of their problems.

All questions are answered direct by letter, so the name and address should be given in full. This saves waiting for the answer to be published, which sometimes occurs several weeks late, depending upon the space available.

Readers' names will not be published with articles, if a request to this effect is received with the letter.

Inquiries not of general interest will be answered by personal letter only. Emergency questions will be replied to by letter or telegram.

Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been made and these are answered by reference to previous issues.

Addresses of business firms will not be published in this department but will be supplied by letter.

Technical questions answered by B. M. Ikert, P. L. Dumas and A. H. Packer; Legal, by Wellington Gustin; Paint, by G. King Franklin; Architectural, by Tom Wilder; Tires, by a Practical Tire Man; General Business questions, by MOTOR AGE organization in conference.

worked on this job but it is to be brought to our shop in a few days. The above description of trouble has been supplied by the owner.—H. P. Burpee, Hartland, N. B.

It is our opinion that although genuine Delco coils have been installed in this plant, they have been of too low a voltage. The Delco light plant is a 32 volt system and utilizes a 32 volt coil to supply ignition to the engine. It is very probable that when the original coil was replaced an automobile coil of 6 or 12 volts was installed and when the 32 volts of the battery is impressed on this coil it will burn up sooner or later. We would suggest that you check on this point and question the owner to determine whether the coil was secured from a Delco automobile ignition supply dealer.

The fact that the engine was submerged under water would have no effect on the coil or ignition system and it is possible for a weak coil to behave just as has been described.

### When the Clutch Grinds

Q—A Clearing House article on page 43 of the December 28th issue of MOTOR AGE covers the above subject. We have just received a letter from one of our subscribers stating that in his opinion the remedy suggested was not correct. His letter gives a very plausible explanation of the condition and a remedy which sounds reasonable.

The letter is as follows:

"I notice in your issue of December 28, 1922, in the Readers' Clearing House an article entitled, 'When the clutch grinds.' I will state frankly that I think your suggested remedy for the trouble is all wrong. I have had a lot of experience with Buick cars and have had this particular trouble happen on several occasions, and after much cleaning and oiling and ruining of clutch facings by getting oil and grease on them, I finally discovered I had been working on the wrong end.

"The grind is not caused by the through-out bearing as is generally supposed, but by the clutch hub failing to float freely on the clutch gear or splined shaft. When the clutch is released, the plates tending to drag or stick causing the hub to move slightly forward coming in contact with end of crankshaft which is revolving while the hub is standing still or nearly so. Then on account of the dry rough surface of the hub and crankshaft rubbing together, the grind develops.

"The remedy for this is to take clutch down, thoroughly clean every part, get hub to work perfectly freely on splined shaft and apply a little graphite to spline and front end of clutch hub, also end of crankshaft. Next see that driven discs work freely on clutch hub. Apply graphite to slots in them, then fit driving discs to studs in flywheel; also put graphite on these studs and you will find after doing this, that the grind will be entirely gone and that the clutch will work smoothly."

This applies to a '22 six cylinder 49 Buick. MOTOR AGE wishes to express appreciation for the cooperation shown in letters of this sort and we particularly wish to thank the Edgar County Buick Company for their cooperation in this respect.

The first of a series of articles on the flat rate begins in this issue on page 9. The most talked of subject in automotive dealer circles today is given a remarkable definition in this first of Dumas' articles.

## Architectural Service

**I**N giving architectural advice, MOTOR AGE claims to assist its readers in their problems of planning, building and equipping, maintenance stations, garages, dealers' establishments, shops, filling stations, and, in fact, any building necessary to automotive activity.

When making request for assistance, please see that we have all the data necessary to an intelligent handling of the job. Among other things, we need such information as follows:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how

large it is expected to be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

How much of an accessory department is anticipated.

## Sales Building With Classy Front

**Q**—I contemplate erecting a one story building for salesroom, accessories and used car display room on the northwest corner of two downtown streets. I will want a classy looking front. The lot is 77 ft. x 168 ft. deep. A mezzanine over the front portion will be required for manager, bookkeeper, etc. There will be no front entrance. Prefer only one side entrance. Any suggestions you may offer will be appreciated.—Guy J. Hartwell, Mobile, Ala.

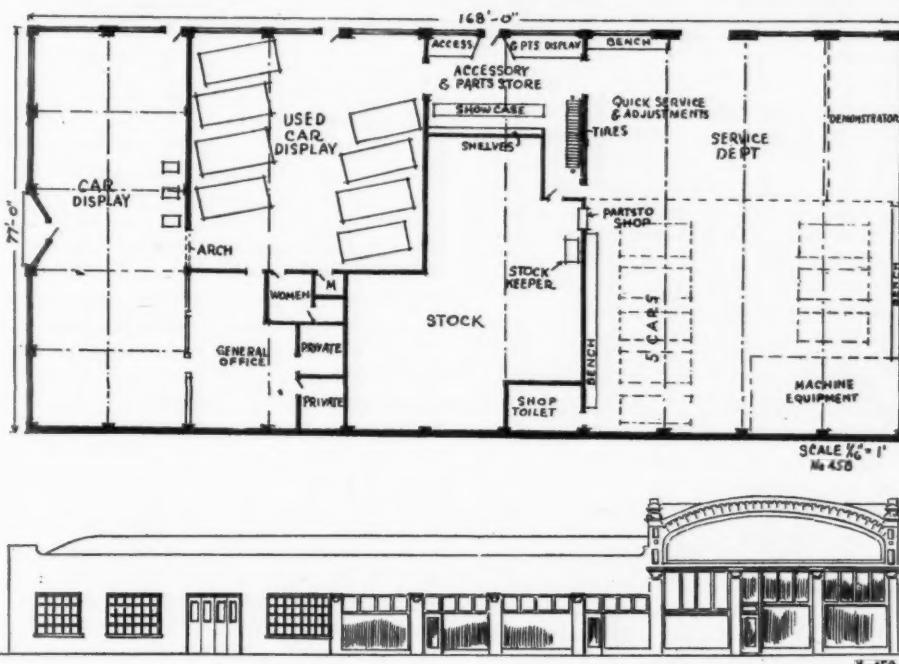
We have followed your second request and made a layout for a one story building. You can see by examining this that it would be practically impossible to install a series of columns for the support of upper floors without ruining it; that is the reason why we suggested that you build part of the building to its full height. The upper part of the walls too, would need taking down to the level of the second floor in order to get in necessary windows etc., so that when the alterations were completed, the original first floor would look like a cocked hat.

If you prefer the balcony idea it is perfectly feasible in the one-story plan. All that is necessary is to raise the front trusses enough to get headroom. This will greatly improve the appearance of the showroom making it much more light, airy and impressive. If the balcony is used a small skylight on each side would greatly improve the light there and also enhance the light in the showroom.

As you do not contemplate storage about all the space you need is for demonstrators and space for customers to drive in for adjustments, estimates and quick repair jobs; the rest can be reserved for shop but need not be partitioned off. Sale of parts may be handled along with accessories and tires or may be handled by the stockkeeper direct.

The location of the used car showroom should be very good being convenient to the salesroom, the office and the accessory store. If the balcony idea is used it would extend over one side of this room but should be high enough to permit cars to be placed under it. Also, the offices being on the balcony, the used car room could be extended back as far as desired.

Our sketch, side elevation, is made to include the balcony with the front trusses raised. The front elevation could be similar to the front of the side but extended to include 5 bays instead of 3. This front section might be treated somewhat in the style of the upper part of the Ford building, picture of which you sent. Possibly if built of terra cotta



it could be taken down later without damaging and raised up but this is an architect's job as it needs a lot of thought.

### LOCATING CAUSE OF MISSING IN TRUCK ENGINE

**Q**—We have a 1½ ton Maxwell truck serial No. 18542, 1921 model. At times this truck will miss, although we have ground in the valves and cleaned out the carbon and installed new spark plugs. We have also checked the wiring and cleaned the breaker points, also drained the gasoline tank and filled up with new gasoline and still it will miss at times. It is just as likely to miss on a light pull as it is going up a hill. When the valves were ground in we found that it was possible to get a .012 thickness gage in between the piston and cylinder wall. Advise the cause of this trouble as we intend to overhaul the truck in the near future.—A Reader.

The next time you get this truck in such a condition that it is missing we would suggest removing the high tension wires one at a time from the spark plugs so as to test the spark. With the engine running hold one of the high tension wires 1/16 in. away from the spark plug to which it is normally attached so that the spark will have to jump a gap in the air in addition to the gap in the cylinder. If the spark continues to jump without missing, the ignition is probably O. K. If however, the spark jumps eight or ten times and then misses a shot and then jumps six or seven times and again misses it shows that you have ignition trouble. Check in this manner on all spark plugs. Another way to check is to hold the wire within 3/16 in. of the engine instead of 1/16 in. of the top of the plugs.

We would suggest your checking the compression by turning the engine over

by hand, as it is quite likely that you are getting leakage of explosion pressure past the piston rings. We draw this conclusion from the fact that you state the clearance is .012 inches. The proper clearance of cast iron pistons should be about .001 for each inch of piston diameter.

For example, with a four inch bore you should have approximately .004 inch clearance between the piston diameter and cylinder wall diameter. This is the difference in diameters and half this much would be the clearance on each side. Inasmuch as the cylinder wall wear seems to be excessive it will no doubt be advisable to re bore or regrind the cylinders and have new pistons fitted when you do the overhaul job you are contemplating.

If trouble is found to be in the ignition system you may find that the ignition head, in which the interrupter is mounted, does not make a good electrical contact with the casting in which it sits, due to the accumulation of dirty oil and grease. We have at times observed cars where the ignition would miss and the trouble would be corrected by connecting a wire from the ignition casting to the engine so as to form a good ground connection.

Other possible causes of ignition trouble are burnt interrupter contacts, contacts in which the layer of tungsten has been all filed away, condenser poorly connected, or a coil which has started to get weak due to breakdown of its insulation. The best way to check for coil trouble is to try another one known to be O. K.

## Testing a Magneto Armature

Q—We have an Eisemann magneto in for repairs and upon testing it find that the coil and condenser apparently seem to be all right but assembling it we find that it does not spark constantly at low speeds, that is when being driven on our test bench with the spark gaps set at about  $\frac{1}{4}$  in. The magnets were charged when the magneto was reassembled, also the points were dressed. What may be the cause and remedy for this condition?

1—One possibility is that the layer of platinum is worn off of the contacts so that they are touching on the iron and do not give satisfactory operation. The test you are making on  $\frac{1}{4}$  in. is a little more severe than necessary as a  $\frac{1}{16}$  in. gap in the air is the equivalent of a  $\frac{1}{32}$  in. gap in the spark plug when used in an engine of average compression.

Another possibility is that the coil is slightly weak, being partially shorted but not enough so that the trouble can be readily detected. We are illustrating a method of testing an armature using a battery and separate interrupter, preferably motor driven. The regular interrupter on the armature cannot be used as it is improperly connected and would put a short on the battery and burn up. It is possible to use it when taken off of the armature and used as shown but having no convenient terminals it is somewhat difficult to use.

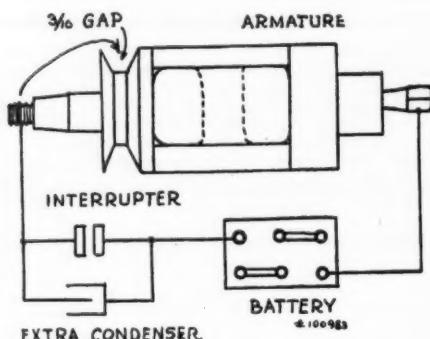
A good armature will give a spark that will jump the improvised gap when it is set at  $\frac{1}{16}$  in. Then, when the extra condenser is applied to the interrupter, the spark will jump  $\frac{1}{16}$  in. or farther and will show up more heat or red color in the spark. The spark will also appear to be fatter, a reddish haze appearing around the central blue spark. The improvised gap shown is made by twisting a piece of wire around the shaft and bending it over toward the slip ring.

Even on a test of this kind, it is difficult to detect a coil which is slightly weak and about the only way to do so is to have another one known to be O. K. and very carefully compare them, trying first one and then the other. Sometimes a coil that gives trouble will work all right at first and if tested for half an hour or so will eventually get weaker and weaker and miss more of the time. If the points are in good condition it is quite likely that the coil is weak, if you are sure the magnets are well charged.

### Testing Dixie Magneto

2—We also have a Dixie magneto type 40 and have it arranged so as to use battery current through the coil for starting. When testing it this way the magneto delivers a good hot spark on the test bench and does not miss but as soon as the battery current is shut off and the magneto is allowed to depend on its own generated energy we find that the spark will miss at low speeds with the spark gaps set at  $\frac{1}{4}$  in. These magnets were also charged before assembling.

2—One thing occurs to us in connection with the charging of the magnets and this is that possibly you do not use a keeper while transferring the magnets from the charger back to the magneto.



A keeper should always be used and applied before the magnet is removed from the charger and taken off only after the magnet has been replaced on the magneto.

Getting a good spark with the battery current would seem to indicate that the coil is all right and it is possible that the interrupter points are not properly timed with the inductor position.

To check this you should take off the side and top sheet metal covers and remove the coil. You will then be able to look down into the magneto and see the position of the inductor when the interrupter points open. Now turn the magneto in the normal direction in which it would be driven on the car and stop just as the cam starts to hit the fiber bumper, in other words just as the interrupter points are ready to separate. At that instant the inductor should have come out from under the pole piece so as to leave a gap about  $\frac{1}{2}$  inch. A setting of .040 in. is normally considered desirable. This means that the interrupter points open at the peak of the generated voltage and accordingly the results are the best possible.

### Rotation of Shunt Generator

3—How can the armature rotation of a shunt wound generator be determined before connecting the field leads to their respective places?

3—It is possible to give a method of checking this but it involves very accurate and careful use of compass combined with a test on both fields and armature. There are so many chances of making a mistake that it is usually considered better to put the machine together as you think right and as soon as you have assembled it to the point where a test is possible, check it by applying the necessary voltage and running it as a motor. Any shunt machine will run in the same direction as a motor that it should be driven as a generator. It is accordingly desirable to connect the field leads, then slip on the end brackets and hold them with a screw or two and make the test. If the generator turns in the opposite direction from which you intend to drive it then your first guess was wrong and the leads should be reversed.

### Difference Between Closed and Open Circuit Ignition System

4—What is the difference between a closed and open circuit type ignition coil and how is it possible to test them and determine from the test whether a coil is designed for one system or the other?—Ohio Subscriber.

4—When ignition systems were originally designed it was desirable to use as little battery current as possible, due to the fact that dry cells were used as a source of energy. This gave rise to open circuit systems, the Atwater-Kent type H being one of the well known examples. On this, notches in the shaft caused a trigger to operate and, when the trigger was released, a pair of contacts were snapped together for a brief instant only. Due to the short time of contact, the coil had to be designed with comparatively few turns in the primary so as to allow the current to build up quickly. Accordingly, if you find a coil which connected to a 6 volt battery draws from 10 to 20 amperes, it is doubtless designed for an open circuit interrupter.

On the other hand later type ignition systems, designed to operate from storage battery circuits, used a close circuit interrupter where the points were in contact for a much longer time. With these the coil did not have to be nearly as quick and it was accordingly possible to use two or three times as many turns of wire and a lower value of current. Accordingly if you get a coil which draws about 5 amperes when connected to a 6 volt battery it is doubtless a 6 volt closed circuit ignition coil.

### 1913 MITCHELL WILL NOT START WHEN HOT

Q—Give information and sketch of how to set the timing gears on a 1913 Mitchell, 7-passenger car. We use it for a service car and when it gets hot we cannot start it.—Reisdorf Garage, Auburn, New York.

The valve timing is as follows: Intake opens 15 degs. after top dead center and closes 30 degs. after bottom dead center. Exhaust opens 40 degs. before bottom dead center and closes 10 degs. after top dead center. Checking on the motion of the piston you will find that the closing of the exhaust valve and the opening of the intake valve occur approximately when the piston has come up on top dead center and then has gone down from  $1/64$  to  $1/32$  inch.

The difficulty in starting might be due to too close a setting between the valve stems and the valve tappets. If this is the case the stems may expand when the engine is hot so that the valves do not rest on their seats. You can check this condition by turning the engine over by hand both when it is cold and when it is so hot that you are unable to start. If the valves are off their seat you would have no appreciable compression and could detect the trouble in this way.

While we do not think it likely, it might be well to check the spark when the engine is hot. We do not see off-hand, anything that could happen to the fuel system due to the engine being hot unless the gasoline pipe runs very close to the exhaust pipe so that the gasoline is vaporized and produces air pockets, which prevent fuel being fed freely to the carburetor. With compression, spark and gas you should be able to start the engine.

## Rushmore System on 1913 Regal

Q.—Kindly send me a wiring diagram of a 1913 Regal using Rushmore starting system and Atwater-Kent ignition, leaving out the terminal box or in other words showing the wires running directly to their connections. Also show internal cut of generator.—Albert Cohn, Independence, Mo.

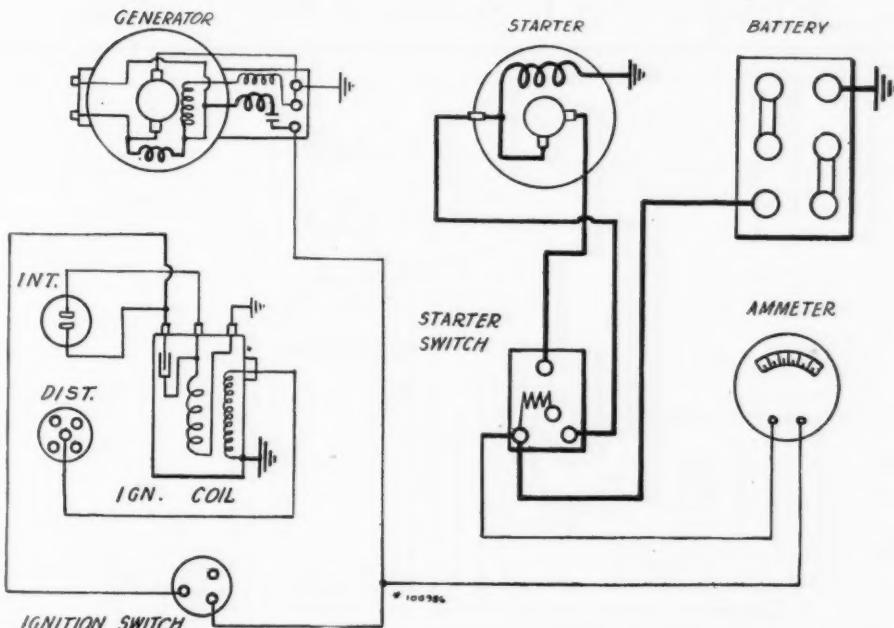
A diagram is shown in accordance with your request. In leaving out the junction box the ballast register was also left out. This means that the two terminals shown at the left of the generator in the diagram have no connections made to them. The difference in operating characteristics will be slight, there being somewhat less current delivered to the battery at low speed. To increase the charging rate an iron wire coil should be connected across the two terminals shown at the left of the generator in the sketch. The dry cell circuit to the ignition switch has also been omitted.

**CORRECTION OF DIRECTIONS GIVEN  
FOR ADJUSTING DURANT FOUR  
DIFFERENTIAL**

In the May 3rd issue of MOTOR AGE this question was asked. "How do you obtain the correct adjustment of differential of Durant Four?" It was stated in the answer that the differential was adjusted in exactly the same manner as the conventional type of bevel gear differential. This treatment is incorrect and we are supplying the following correction supplied by two of our readers.

The Durant differential differs from the conventional construction in that the bearings which carry the differential carrier are slideably mounted in the axle housing, and, although they have a movement of about  $\frac{1}{2}$  inch on each side, the movement is not controlled by any adjusting nut within the differential housing. Adjustment of the ring gear on the differential of the Durant Four is secured by movement of the bearings at the outer end of the axle housing.

The bearings that carry the differential carrier are of the ball type, while the outer axle bearings are of the tapered roller type. These outer bearings take



the thrust of the differential on each side, and the axle shafts, although they are splined into the differential carrier and gear butt up against a thrust block located within the differential carrier casting. Adjustment is made for movement of the ring gear in or out, at the outer bearings and the method of procedure and the effect produced is the same on these outer bearings as is obtained in the conventional type of differential when adjustment is made by moving the differential carrier bearing adjustment nut.

At the time the article in the May 3rd issue was written there was not available any cut of the differential axle and we assumed that it followed the construction used in the majority of axles of the  $\frac{3}{4}$  and full floating type. We have since been supplied with a cut which we are printing herewith which shows very clearly the construction and method of adjustment.

We wish to thank the MOTOR AGE readers who supplied the correction of this article and are more than pleased to observe that the contents of the Readers' Clearing House are read so carefully that no mistake can go long unnoticed.

## THEY SERVE APELCOS ON THIS PULLMAN

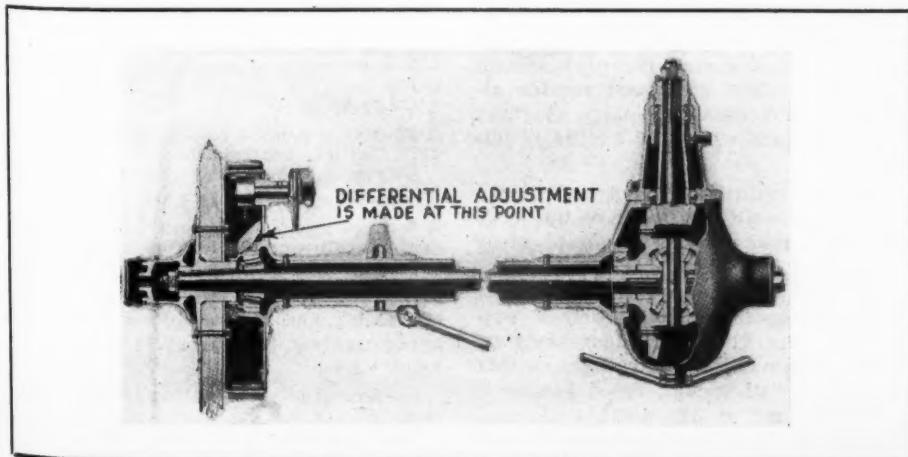
Q—Send a wiring diagram of a Pullman car model 4-24, using Apelco generator and starter model A-25. This unit when repaired would run as a motor on either the generator or starting circuit when removed from the car. When installed on the car it will also operate as a starter but there is a short or ground somewhere when the cables are applied to the battery terminals. Application of the cables to the battery also causes the cutout points to close.—Wm. Sedam, Kasson, Minn.

The diagram you require was published in the May 10th, issue of MOTOR AGE in the Clearing House department. We have two suggestions, one being that you check the wiring very carefully to see that it is exactly like the diagram. It seems to use that you are applying battery voltage to the fine winding of the cutout which causes the contacts to close.

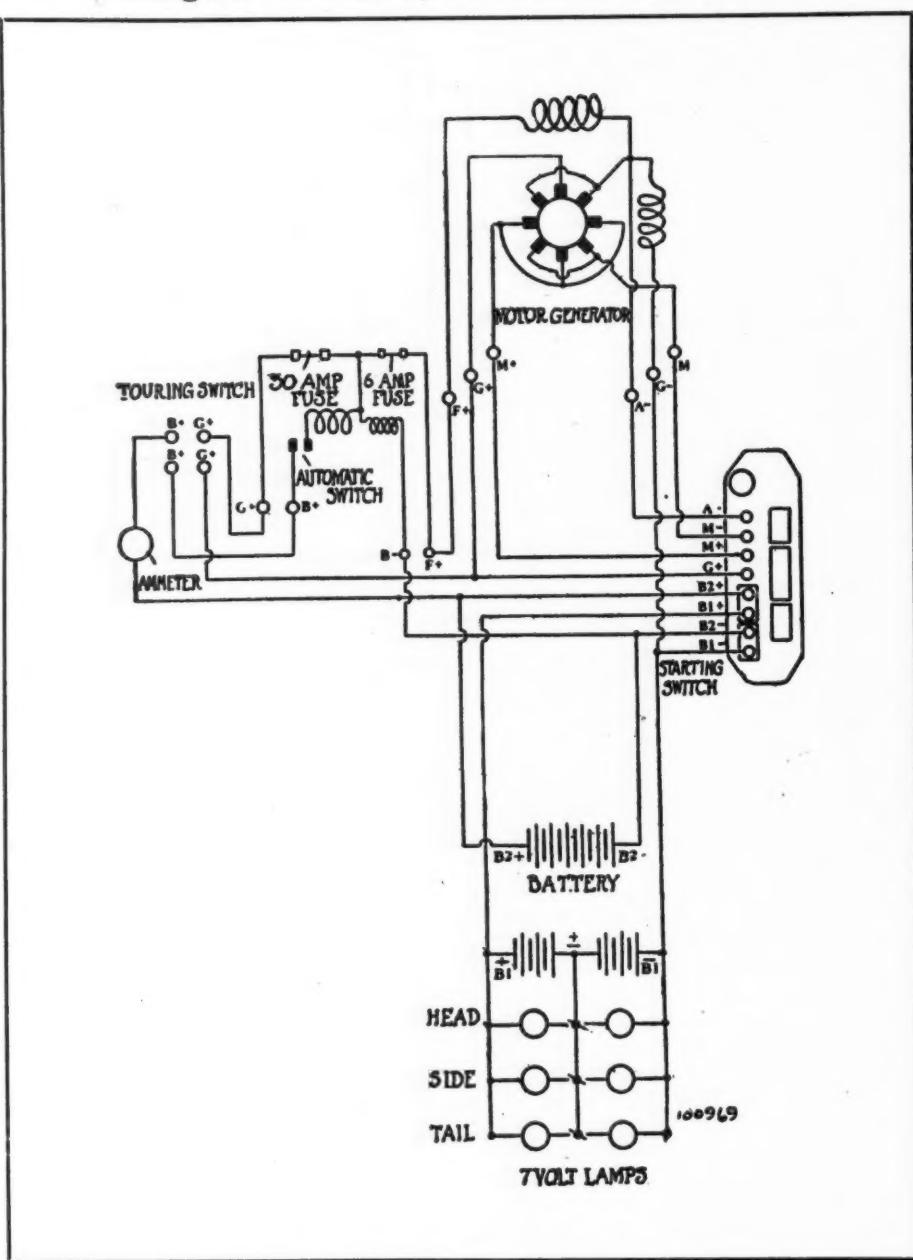
Another possibility is that there is trouble in the series parallel switch used for starting. This is shown very clearly in the diagram and you will note that, in the normal position, it connects the A minus or ground terminal to the one just above it which is marked B minus and D minus.

Back of the starting switch is a bus bar connecting the B plus terminal to the upper left hand terminal which has no marks. In some switches this bus bar has burnt out and if this is the case you can make a connection on the outside instead. In the normal position of the starting switch you will notice the connection is also completed from the A plus to the terminal above it and through the bus bar to B plus. When stepping on the starting switch these connections just mentioned are broken and instead you have a connection from A plus to M plus and from B plus to A minus.

Checking the starting switch and properly wiring the car should give normal operation.



## Wiring of U. S. L. System on 1913 Overland



Q—Furnish wiring diagram for 1913 Overland.—V. C. Stoltenberg, Manitowoc, Wis.

Diagram is supplied in accordance with your request.

#### OLDSMOBILE EIGHT FOR DIRT TRACK RACER

Q—We have an Oldsmobile 8, 1916-44 model and have cut it down to 90 inch wheelbase and figure on using it for dirt track racing. Would like to know what the gear ratio is in this 1916-44 model and whether you would advise gearing it up or not. We also thought of getting an eight cylinder magneto and installing it with the idea of increasing the speed.

We have driven this car 60 m.p.h. and that is the best we can get out of it. The tires are 33x4 and we thought some of putting on smaller wheels to lower the car. Would this cut down the speed? Any additional information will be appreciated.—Arthur G. Johnson, Minneapolis, Minn.

In the first place would say that the battery ignition as supplied on the Oldsmobile will give you as much speed as any other ignition. If however, you sus-

pect that the spark is somewhat weak at high speed you can increase the strength of it by using an 8 volt battery. Another way is to use a coil which draws more current on 6 volts. For very high speed a coil designed for open circuit interrupter might give good results, although it will cause excessive sparking at the contacts while the engine is idling.

The gear ratio is 4.42 to 1 and we believe it would be well to leave this gear ratio alone and cut the wheels to 28 or 30 inches. On dirt track race cars motorcycle wheels are often used. It is impossible to predict whether cutting down the wheels will increase your speed or decrease it. However, as this engine is a rather high speed engine it is possible that it has not yet reached the peak of its power curve and in this

case the smaller wheels will give you additional speed.

We assume that you have read a number of articles in Motor Age in regard to speeding up various cars. If so, you will note that the essentials for high speed include having the crankshaft and rotating parts carefully balanced, also having connecting rods and pistons balanced. Increasing the compression by milling off from 1/16 to 1/8 inch from the cylinder heads will also give greater power. With increased compression it may be found that the engine will knock and if this is the case the condition can be overcome by using a fuel composed of half gasoline and half benzol. Grinding out the valve ports with a flexible shaft and small grinding wheel will allow the fuel to enter the cylinders more easily.

Would suggest your consulting with local carburetor concern in regard to using a larger carburetor or using larger jets in the same carburetor.

If the valves are not too close together it is possible that you can get larger ones and ream out the valve seats so as to take them. After you have made the changes above suggested, if you wish additional speed, it might be obtained by having a special racing camshaft made and if you get to this point we will be glad to give you the name of concerns capable of making one for you. After cutting down the wheels it may be necessary to try various gear ratios in the rear axle to see which one enables you to get the greatest speed.

#### DATA ON TEXAN CAR

Q—Advise the make of engine used in a Texan car model A36-1918, engine No. 2192.

1—Information on this car is difficult to secure. However, to the best of our knowledge it used a Lycoming engine.

2—Give make of timing chains used in the above engine.

2—As nearly as we can determine timing chains were not used as the cam-shaft was gear driven. You can however, obtain definite information from the Lycoming Company.

3—State method of taking up the main bearings.

3—Drain oil from the engine and remove the lower part of the crank case or oil pan. Take off main bearing cap and remove one shim on each side.

4—Give make of clutch used in above car.

4—Borg & Beck.

5—Give make of rear axle used in above car.

5—Peru.

6—Give r.p.m., h.p. and gear ratio of 1922 Cadillac touring car.

6—The gear ratio is 5 to 1. The h.p. is approximately 82 at 2,500 r.p.m.

7—Give r.p.m., h.p. and gear ratio of 1922 Lincoln touring car.

7—The gear ratio is 55 to 12 or 4-7/12 to 1. We have no absolute data on the h.p. and r.p.m. but would estimate it at approximately 80 h.p. at from 2,400 to 2,600 r.p.m.

8—Give gear ratio of 1922 Lincoln roadster.—Frank Harvey, Hominy, Okla.

8—55 to 13 or 4-3/13 to 1.

## Ward-Leonard Electrical System on Ford

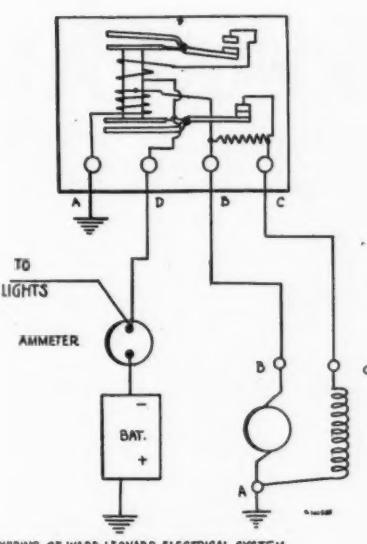
Q.—Send internal circuit diagram of Ward Leonard generator No. 2691 type EL. On what cars was this generator used? Is it a 6 or 12-volt machine? How is the output regulated?

This generator is installed on a Ford car with a 12-volt battery and a common cutout. It will not build up in voltage although the windings all test out O. K. When the engine is first started the voltmeter registers about 11 volts and then gradually falls off to about 7 volts. However, the output shows up as 7 amperes. The generator is driven by a belt from the fan. The wiring diagram as used at present is shown in the attached sketch.—D. C. Slick, Granite City, Ill.

Information on Ward-Leonard system is somewhat meager, we accordingly have no specific information on the generator in question but show three diagrams, one of which shows a standard Ward-Leonard regulator connected to a generator, together with a battery and ammeter. You will notice that generators used with a regulator of this type always have one end of the field disconnected from the armature as the regulator contact or resistance completes the circuit to the other brush.

We have duplicated your diagram, which shows the field connected to both brushes. We have also made your diagram over again, changing it somewhat to show correct connection for ammeter, voltmeter and lights. We have also added a series coil in the cutout which however has nothing to do with the trouble you experience. We have also shown an iron wire resistance coil connected in series with the shunt field which could be used in case you get the generator working and find that it charges too much.

We have no definite information as to the voltage but believe this is a 12-volt machine. The reason for showing the ammeter and voltmeter correctly connected is that the symptoms you describe are not exactly logical from an electrical standpoint. For example, you state that the voltage is 11 at first and then drops off to 7. This is impossible if the battery is in good condition and the voltmeter is connected across it. Only a 12-volt battery in very bad condition can drop down to 7 volts and then usually when a current is taken from it.



### *Ward-Leonard generator with voltage regulator*

We would recommend having the battery charged and then making the following test. Lift one of the brushes and then close the cutout points by hand with the engine standing. The ammeter should show a discharge of perhaps 2 or 3 amperes, which would be field current. Then drop the brush onto the commutator again and repeat the test. This time the discharge should be field and armature current and will probably be from 15 to 20 amperes. This shows that you have both field and armature circuits.

Then close the cutout points by hand and hold them that way and start the engine. The discharge current should come up to zero and then go over to the charge side of the meter. If it stays at 15 or 20 amperes discharge you probably have an open field circuit. If it comes up to about zero but will not show any appreciable charge you probably have a defective armature. The voltmeter reading should drop when you are taking current from the battery and should rise if the generator charges the battery. A full charged battery will show about 18 volts when being charged, but may drop down to about 12 volts when you pull a fairly heavy current from it again.

While we have shown the diagram which requires a regulator we do not believe you would find it absolutely es-

sential to use this. If you get the generator working and find that it charges too much would suggest using the iron wire coil so as to give from 5 to 12 amperes at speeds of from 10 to 25 m.p.h.

## A HUPMOBILE OF UNCERTAIN NATIVITY

Q—On April 26th, last, you wrote to Mr. J. E. Dorotzak of the East End Garage, Windber, Pa., regarding the age of a certain Hupmobile as indicated by the serial number and the engine number of the car. You suggested that a more perfect statement of the two numbers would enable you to state more positively as to the age of the car and the engine and the writer has been requested to give you the following information:

This Hupmobile sedan bears the following numbers: Mfg. Serial No. R. 91869 Engine No. 45001 C.—J. D. Patton, Windber, Pa.

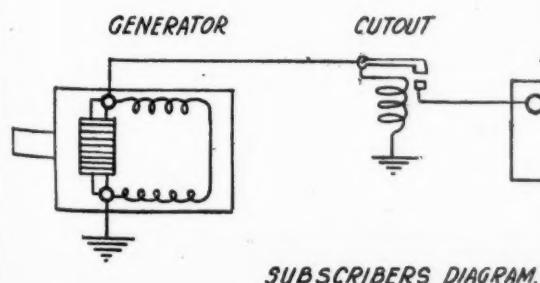
To get an accurate record of this car it will be necessary to trace back its history to the time of purchase from a distributor and then back to the Hupmobile factory. The serial number indicates that the chassis is a 1923 model while the engine number is of the series installed in chassis during 1921.

We have been informed by the local Hupmobile distributors that in all unaltered cars the engine serial number does not vary more than four to five hundred numbers from the manufacturing serial number of the chassis. If you have any knowledge as to the location of the distributor who sold the car and to the vicinity he might be able to give you further information as it is possible that the engine has been removed and another engine installed in the chassis.

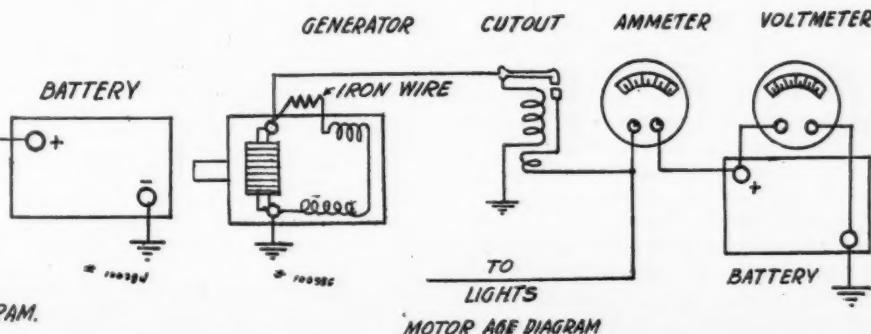
## READER OFFERS HELP WHERE ENGINE CUTS OUT

Q—In regard to Mr. Carl T. Hallenburg's trouble on a 37 A Oldsmobile, I wish to say we have had the same trouble and in testing the ignition coil found that at one time it would give a very good spark and then again it would give a very weak spark and at times was very hard to start. We found that a new coil corrected the difficulty and would recommend that Mr. Hallenburg try a new coil on his car.—W. J. Young, Rosedale, Kans.

Note—MOTOR AGE wishes to express appreciation for the above suggestion from Mr. Young.



These circuits are substantially O. K. for average generator



### Improved circuits showing voltmeter and ammeter

# GETTING MORE OUT of the SHOP

MAKE equipment the keynote of your next maintenance advertising campaign or series of letters.

Boe Oil and Grease Pumps are manufactured by the Boe Manufacturing Co., Minneapolis, Minn. The line consists of two pumps, the Two-Way Valveless Bucket and the Hook-Em Barrel Truck. The No. 1 oil pump is a one qt. stroke pump and the No. 2 grease pump measures exactly one lb. of grease a stroke. The grease bucket is made of heavy steel, reenforced at top and bottom. The capacity is 30 lbs. and measures one-half pound per stroke. It will pump kerosene into a gear case for cleaning and draw the old grease out without disturbing the contents of the bucket.

The Hook-Em Truck has a capacity of over 1500 lbs. There is a double wheel construction in front that makes it easy to handle and an adjustable sliding hook clamps any 15 to 60 gal. wood or steel barrel so that it can be transported to any part of the shop.

The Reflector & Illuminating Co., 565 W. Washington St., Chicago, Illinois, have recently placed on the market Flood-O-Lite, Jr., form C, in addition to Flood-O-Lite, Jr., form I, now used extensively for interior flood-lighting.

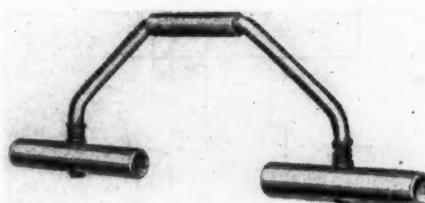
Flood-O-Lite, Jr., form C is equipped with a special silvered glass reflector for producing a concentrated spot of light whereas Flood-O-Lite, Jr., form I, produces a wide flood of less intense illumination. Flood-O-Lite, Jr., form C is particularly adapted for the spot lighting of individual parts of a window, announcement cards, or similar display features. 200 or 300-watt type C lamps can be used. Color-Lite attachments can be supplied for producing red, amber, green or blue spot lights.

Hobart Bros. announce a new constant potential battery charging outfit of 100 ampere capacity for the small electrical shop and battery station. It uses the patented HB constant potential winding which not only insures constant voltage, but is non-reversing.

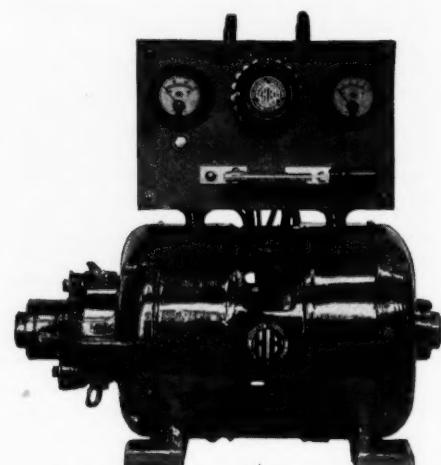
The outfit comes complete with cable, busbars, switchboard, instruments and switches and sells on a \$20 a month payment basis. Details may be obtained from the Hobart Bros. Co., Box M, Troy, Ohio.

The Detroit Vise Tool Belt Lacer, shown in the cut on this page, is the product of the Detroit Belt Lacer Co., Detroit. The cut shows how the tool is set in the vise and is so constructed that the jaws close evenly and together. It sells for \$3.50 and an assorted box of lacing is priced at \$1.50. These instruments are particularly well adapted to use on tractor and farm equipment belts.

A drop forged steel automobile "horse" with ample clearance for truss rod and spring when supporting rear axle housing and chassis frames respectively, and



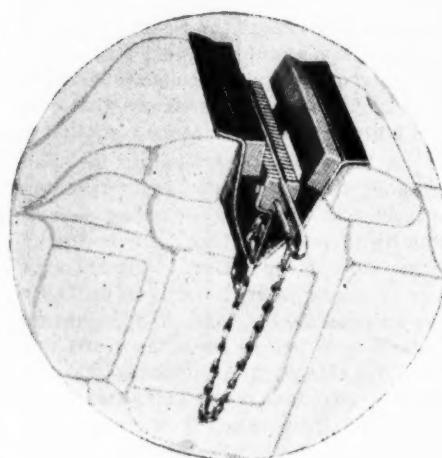
Copper Head service wrench



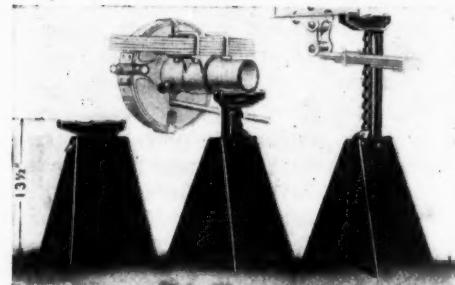
HB constant potential charger



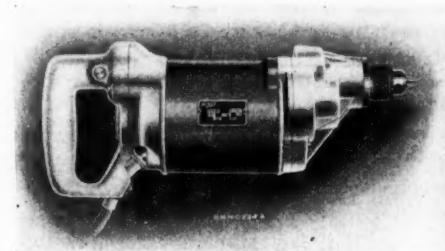
Flood-O-Lite, Jr., Form C



Detroit vice-tool belt lacer



Garage utilities horse



Hisey portable electric drill

which can be instantly adjusted at any height for front or rear axle is the product of the Garage Utilities Co., Hackensack, N. J.

This adjustable "horse" fits all cars and replaces the wooden "horse" and the clumsy wood blocking when making repairs that require the rigid suspension and support of axles or chassis frames, and can instantly be set at any height variable by inch adjustments from 13½ to 23½ inches.

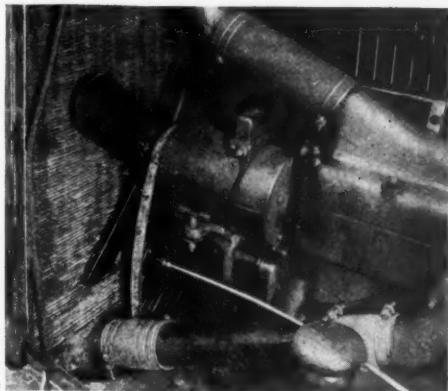
An extremely large factor of safety is provided in supporting the heaviest of cars. This adjustable "horse" can also be used as a jack at any height by use of a lever. The "horse" weighs 18 pounds and is 10 inches square at the base.

Another Copper Head Service Wrench, No. 4200 is announced by the F. R. Lueck Corp., 27 Erie street, Milwaukee, Wis. The price is \$3.85 and the cut

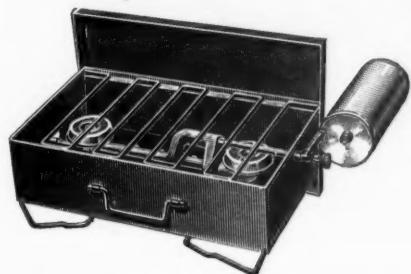
shows the wide adaptability of the wrench to work on the chassis, frame, motor and wheels. Some of the most prominent places where the wrench is used are the cylinder head bolts, connecting rod bolts, shackle bolts, rim bolts and disk wheel bolts.

Hisey Portable Electric Drills and Reamers are made by the Hisey-Wolf Machine Co., Cincinnati, O. The drill shown on this page is the type 18 KUM and is especially recommended for drilling sheet metal, brass and aluminum and for wood boring. The capacity in steel in inches is  $\frac{1}{4}$ , the speed under normal load is 1000 R. P. M., the net weight is nine lbs. It is 13 ins. in length and is supplied with 15 ft. of electrical conductor cable fitted with separate fused attaching plug, one extra cartridge fuse and Jacobs drill chuck for holding straight round shank drills from 0 to  $\frac{1}{4}$  in. diameter.

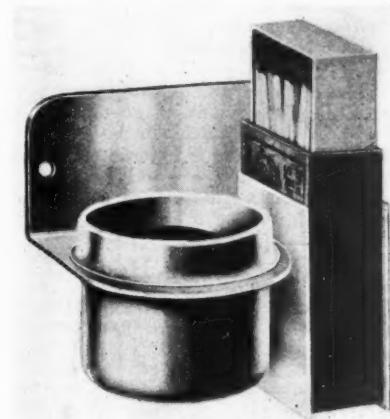
# BOOSTING ACCESSORY SALES



Challenge mechanical windshield wiper's attachment to fan belt



Tourist camp stove



Empress ash tray

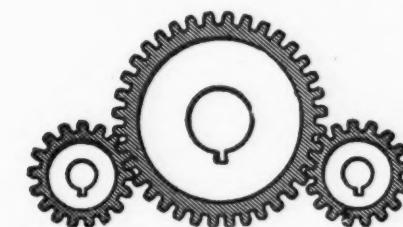
ARE you reading the tire articles appearing in MOTOR AGE? If not, you are missing some hot tips on tire selling and the tire industry as a whole. Tires, as you know could make up a mighty profitable business for you. These articles will aid you in obtaining a better understanding of the "ins and outs" of tire selling.

Tires can be made to be a big portion of your accessory business and the articles this week on competition is especially good.

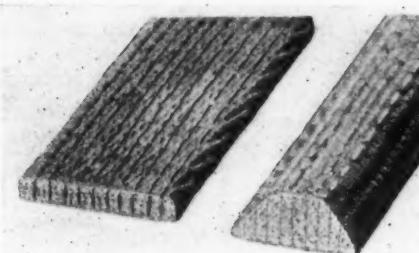
The Challenge Mechanical Windshield Wiper, the product of Berill & Co., 605 Main St., Buffalo, N. Y., is mechanically operated direct through a special rein-



Skaggs chain kit and combination foot rest



Perfection silent timing gears



Straightline endless fan belts

forced flexible shaft, as shown in the cut, from the fan belt of any car with a fan belt or from the transmission. This flexible shaft is tested for strength and is equal to torque necessary to drive a  $\frac{1}{8}$ -in. drill through a steel plate.

The oscillating mechanism consists of three cut steel gears with a shaft to wiper arm, reduction of 100-1, running in special graphite oil, and having ample tooth surface to insure several years' service with no appreciable wear.

The driving pulley on the other end of the flexible shaft, provided with a clutch which is operated by a small button on the wiper case, within convenient reach of the driver. This driv-

ing pulley is hollow and contains enough special graphite oil for several years' service. The pulley is held in frictional contact with the fan belt by means of a universal bracket which can be installed on almost any make of car.

The wiper arm construction is also novel, being a stamping of flexible sheet steel which after being correctly installed, uniformly bears against the glass.

The size of the wiper case is very small, its biggest dimension is less than 2 ins.

H. & L. Epstein, 1204 Washington avenue, St. Louis, is the distributor for the Tourist camp stove, shown in the cut on this page. The cut shows the stove, open, ready for use. It folds into a neat suitcase-like shape and has a handle. It can be carried in the luggage carrier and takes little room. The case is made of heavy gage steel and is finished in black enamel.

The Skaggs Chain-Kit and Combination Foot Rest is the product of the Pyramid Motors Co., 402 Second street, Canton, O. The cut shows this accessory, fitted to the floor of the car where it conceals the chains and provides a handy place for them.

The Empress Auto Ash Tray, as shown in the cut, provides a holder for matches and a receptacle for ashes. It can be attached to any part of the car. It is pressed from heavy sheet metal and finished with a heavy durable nickel plate. The ash receptacle is made in two parts and is easily taken apart for cleaning. The retail price of the Empress is \$85 and it is made by the Bowen Products Corp., Auburn, N. Y.

Perfection Silent Timing Gears, the only automobile gears to be made of the patented process, Formica, have an interesting mode of manufacture. The Formica has as a base, layers of long fiber cotton, laminated and then placed under hydraulic pressure of 47,000 lbs. per sq. in. This results in a tough, dense material with great strength and yet resilient and silent. A complete line for practically every car and truck can be supplied by the manufacturers, Perfection Gear Co., 1425 Michigan avenue, Chicago.

Sections from the Straightline Endless Fan Belts are shown on this page. These fan belts, the products of the Rosendale-Reddaway Belting & Hose Co., Woolworth building, New York City, are impregnated with a special compound which renders them impervious to water, oil and heat.

A line of Superior brushes, made by the Superior Brush Co., Hartford, Conn., is devoted to use on the automobile. Dust and polish brushes and brooms are among these. Also, there is a line of brushes for the floor, manufactured by the same company.

# COMING MOTOR EVENTS

## AUTOMOBILE SHOWS

Cleveland, O.	Used Car Show	June 16-24
Green Bay, Wis.	Annual Automobile Show	Aug. 27-30
Chicago	Commercial Vehicle Show	Sept. 1-7
Sacramento	Annual Automobile Show	Sept. 3-8
Indianapolis	Annual Fall Automobile and Accessory Show	Sept. 3-8
Memphis	Annual Automobile Show	Sept. 28-30
Fresno, Calif.	Automobile Show	Sept. 28-Oct. 5
New York	Annual Closed Car Show	Oct. 1-6
Little Rock, Ark.	Annual Automobile Show	Oct. 8-13
Chicago	Chicago Closed Car Show, Coliseum	Oct. 13-20
Dallas, Texas	Annual Fall Show	Oct. 13-28
Washington, D. C.	Annual Fall Automobile Show	Oct. 23-31
Waco, Texas	Waco Automobile Dealers' Assn.	Oct. 28-Nov. 5
New York	Foreign Automotive Association Exposition	Nov. 4-10

## RACES

Tours, France	Grand Prix 500 Mile Race	July 2
Kansas City, Mo.	Kansas City Speedway	July 4
Pikes Peak Hill Climb		Sept. 3
Italy	Monza Speedway, 500 miles	Sept. 9

## CONVENTIONS

Spring Lake, N. J.	Summer Meeting of the Society of Automotive Engineers	June 19-23
Chicago	National Conference of Trade Association Secretaries and Managers under the auspices of the National Automobile Dealers' Assn.	July 23-24
Dixville Notch, N. H.	Summer Meeting of the Automotive Equipment Association	June 25-July 1
Olympia, Wash.	Convention Washington Automotive Trade Association	July
Mobile, Ala.	Semi-Annual Meeting of the Alabama Automotive Trades Association	July 23
Erie, Pa.	Annual Convention, Pennsylvania Automotive Association	Aug. 13-14
Chicago	Exhibit and Convention of Automotive Equipment Association	Nov. 12-17

# SQUEEKS & RATTLES

Send us a line

### Squeeks & Rattles Club

If your application for membership is not in yet, then think up a good laugh-getter and send it. Just as soon as we get strong enough, we intend to make it necessary for all men wishing to remain in the automotive business to be members of Squeeks & Rattles Club, if they refuse, we'll laugh at them so much and so often that they'll get sore and quit or laugh and come in.

There's only one man who never gets sore at all the laughing they do and that's "the Heart choice for president."

BUTCH: Thought you had deserted us.

H. L.: There's no use arguin' with a woman, if she says no, then don't do it.

B. V. D.: Write to Beatrice Fairfax—this aint a beauty colym.

STEVE: See note at foot of this page.

WILLIE: We don't think so, however, one can never tell, you know.

### Some Slogans by Steve

Slogan for a blast furnace: Have you had your iron today? Slogan for a manicure parlor: The well-equipped shop gets the business.

The undertaker's slogan: Say it with caskets.

Send us a Slogan!

### Kay Em Roberts' Kontribs

Jinks tells me that he has driven his car for three years and hasn't paid a cent for repairs.

That's right—I'm the guy who did all of his repair work. (That one always used to get a laugh)

There's a Difference

"Automobiles painted: \$15. Fords: \$10.

Sign seen in Des Moines.

She said, "I'm crazy to have a car."

The old fiend replied, "If I get crazy too I'll buy you one."

And now:

Two souls with but a single thought,  
Two streets that cross as one;  
Two flivvers trying to get there first—  
Oh gosh! Aint we got fun?

Money used to "make the mare go," but since the mare's place has been usurped by the auto the shoe is on the other foot. It's the money that goes.

### Saving Hints for Motorists

By George A. Bunker

How to Eliminate Tire Expense—Run on the rim. How to Reduce Gas Bills—Invite a party of friends for a ride and shortly after starting discover you are out of gas and after having the tank filled find that you have left your purse at home.

How to Save Oil Costs—Ride in a taxi.

How to Lower Repair Bills—Cultivate the friendship of a good mechanic and after inviting him out to ride some Sunday tell him that you cannot start until a few of the family car's ills have been cured. He will be glad to show you how to do the work and the less aptitude you show in learning the more anxious he will be to do the work for you.

How to Secure Accessories for Less—Play up to the neighbor who owns an accessory store and after doing your stuff he will be glad to furnish anything you want at cost.

How to Secure a Battery Without Cash Outlay—Tell your used car dealer friend that your battery is "gone" and suggest that he surely has some used car with a good battery which he would be glad to trade even for your battery as a used car does not need a good battery.

### Referred to Reader's Clearing House

I. M. Nutts wants to know who makes the Annie Lorry. Anyone knowing the whereabouts of this factory can get in touch with Mr. Nutts by addressing him at the Insane Asylum's Department for Mentally Mildewed Mechanics at Winnipeg.

Sign hanging over service department door of Kankakee dealer:

We Fix Everything While You Wait  
Bring Your Wife Along

TOMMY MILTON meant well when he wrote this testimonial; and the Marmon folks meant well when they put it into an ad: "My Marmon has now gone more than 40,000 miles; and, judging by the way it behaves today, it is going to be a long time before you will interest me in another one."

—Chicago Tribune.

Pretty soon, we'll have a vacation to worry about.

We like to worry about such things.

But if the Chicago weather keeps as close to zero as it has been, we'll spend our vacation shoveling snow.

What would be nicer, though, than to use your ice skates on your July vacation?

Or to watch a ball game where all the players have snow shoes on?

LEW BRICATION

# Current Motor Truck Specifications

(This list comprises trucks distributed on a national basis)

MAKE AND MODEL	TONS CAPACITY	PRICE	ENGINE			REAR AXLE			TIRES			MAKE AND MODEL			PRICE	ENGINE			REAR AXLE			TIRES		
			MAKE & MODEL	BORE & STROKE	CLUTCH MAKE	GEARSET & MAKE	FINAL DRIVE	FRONT	REAR	MAKE & MODEL	BORE & STROKE	CLUTCH MAKE	GEARSET & MAKE	FINAL DRIVE	FRONT	REAR	MAKE & MODEL	BORE & STROKE	CLUTCH MAKE	GEARSET & MAKE	FINAL DRIVE	FRONT	REAR	
Ace. . . . .	30 1 1/2	\$2600	Mi-412	3 1/2 x 5	B-L.	B-L.	Ti-6500	W.O.	34x3 1/2	34x5k	Duplex. . . . .	GH 1 1/2	Cov. . . . .	Bu-WTU	3 1/2 x 5 1/2	Cov. . . . .	Cov. . . . .	Sh-1501	W.O.	35x5	36x6			
Ace. . . . .	40 2-1/2	3250	Mi-402	4 1/2 x 5 1/2	B-L.	B-L.	Ti-6400	W.O.	36x4	36x7k	Duplex. . . . .	A 2	Cov. . . . .	Hi-400	4x5 1/2	Cov. . . . .	Cov. . . . .	Sb-103	W.O.	35x5	38x7 1/2			
Ace. . . . .	60 3	3800	Mi-402	4 1/2 x 5 1/2	B-L.	B-L.	Ti-6500	W.O.	36x4	36x8	Duplex. . . . .	AC 2 1/2-3	Cov. . . . .	Hi-400	4x5 1/2	B-L.	B-L.	Vu-4	W.O.	34x5	36x8			
Acme. . . . .	20 9-1	—	Co-N. . . . .	3 1/2 x 5	B&B. . . . .	Cot. . . . .	Ti-2500	W.O.	34x5	34x5n	Duplex. . . . .	E 3 1/2	Cov. . . . .	Bu. . . . .	4 1/2 x 5 1/2	B-L.	B-L.	Own. . . . .	IG. . . . .	36x8	36x8			
Acme. . . . .	30 1-1/2	—	Co-N. . . . .	3 1/2 x 5	B&B. . . . .	Cot. . . . .	Ti-6352	W.O.	34x3 1/2	34x5	Eagle. . . . .	100 2	Cov. . . . .	Bu-CTU	3 1/2 x 5 1/2	Cov. . . . .	Cov. . . . .	Ru-6000	IG. . . . .	34x4k	34x7k			
Acme. . . . .	40 1-1/2	—	Co-J. . . . .	3 1/2 x 5	B&B. . . . .	Cot. . . . .	Ti-6400	W.O.	34x3 1/2	34x5	F. W. D. . . . .	B 3	Cov. . . . .	Wi-A. . . . .	1 1/2 x 5 1/2	H-S. . . . .	Cot. . . . .	Own. . . . .	SP. . . . .	36x6	36x6			
Acme. . . . .	60 2 1/2-3	—	Co-K. . . . .	4 1/2 x 5 1/2	B&B. . . . .	Cot. . . . .	Ti-6500	W.O.	36x4	36x7	Fageol. . . . .	1 1/2	Cov. . . . .	Wa-BUX	3 1/2 x 5 1/2	B-L. . . . .	B-L. . . . .	Own. . . . .	Ti-6461	W.O.	34x3 1/2	34x6		
Acme. . . . .	90 3-4 1/2	—	Co-I. . . . .	4 1/2 x 5 1/2	B&B. . . . .	Cot. . . . .	Ti-6600	W.O.	36x5	40x10	Fageol. . . . .	2 1/2	Cov. . . . .	Wa-CU	4 1/2 x 5 1/2	B-L. . . . .	B-L. . . . .	Own. . . . .	Ti-6560	W.O.	34x4k	36x7		
Amer. La France 3 1/2	4950	Own. . . . .	4 1/2 x 6	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	W.O.	36x5	36x5	Fageol. . . . .	4	Cov. . . . .	Wa-DU	4 1/2 x 6	B-L. . . . .	B-L. . . . .	Own. . . . .	Ti-6660	W.O.	36x5	36x5		
Amer. La France 5	5500	Own. . . . .	4 1/2 x 6	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	W.O.	36x6	40x6	Fageol. . . . .	6	Cov. . . . .	Wa-DU	4 1/2 x 6	B-L. . . . .	B-L. . . . .	Own. . . . .	Ti-6760	W.O.	36x6	40x6		
Armeleder. . . . .	20 1 1/2	—	Bu-CTU	3 1/2 x 5 1/2	Ful. . . . .	Ful. . . . .	Ti-6400	W.O.	36x4	34x5k	Federal. . . . .	R 2	Cov. . . . .	Co-J. . . . .	3 1/2 x 5 1/2	B&B. . . . .	B&B. . . . .	Det. . . . .	Ti-6250	W.O.	33x5n	33x5n		
Armeleder. . . . .	HWB 2 1/2	—	Bu-HTU	4 1/2 x 5 1/2	B-L. . . . .	B-L. . . . .	Ti-6500	W.O.	36x4	36x7k	Federal. . . . .	S 2 1/2	Cov. . . . .	Co-J. . . . .	3 1/2 x 5 1/2	B&B. . . . .	B&B. . . . .	Det. . . . .	Ti-6252	W.O.	34x6nk	36x6nk		
Armeleder. . . . .	HWC 2 1/2	—	Co-C. . . . .	4 1/2 x 5 1/2	B-L. . . . .	B-L. . . . .	Ti-6600	W.O.	36x5	36x8d	Federal. . . . .	U 2	Cov. . . . .	Co-K. . . . .	4 1/2 x 5 1/2	B&B. . . . .	B&B. . . . .	War. . . . .	Ti-6660	W.O.	36x4	36x5		
Armeleder. . . . .	KWB 3 1/2	—	Co-E. . . . .	4 1/2 x 5 1/2	B-L. . . . .	B-L. . . . .	Ti-6700	W.O.	36x5	36x12	Federal. . . . .	V 2	Cov. . . . .	Co-L. . . . .	4 1/2 x 5 1/2	B&B. . . . .	B&B. . . . .	War. . . . .	Ti-6760	W.O.	40x6	40x6		
Atlas. . . . .	25 1/4	1495	Bu-WTU	3 1/2 x 5 1/2	B&B. . . . .	B&B. . . . .	Own. . . . .	W.O.	34x4	34x4 1/2n	Federal. . . . .	X 2	Cov. . . . .	Co-B. . . . .	4 1/2 x 5 1/2	B&B. . . . .	B&B. . . . .	Front. . . . .	Ti-6800	W.O.	30x3 1/2n	32x4 1/2n		
Atlas. . . . .	40 1 1/2	1950	Bu-WTU	3 1/2 x 5 1/2	B&B. . . . .	B&B. . . . .	Own. . . . .	W.O.	36x6	36x6n	Federal. . . . .	TT 1	Cov. . . . .	33x4	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	36x5	36x4				
Attorbury. . . . .	20R 1 1/2-2	2475	Co-J. . . . .	3 1/2 x 5	Ful. . . . .	Ful. . . . .	Ti-6400	W.O.	36x4	34x6n	Federal. . . . .	TT 1	Cov. . . . .	Bu-CTU	3 1/2 x 5 1/2	B&B. . . . .	B&B. . . . .	Front. . . . .	Ti-6800	W.O.	30x3 1/2n	32x4 1/2n		
Attorbury. . . . .	22C 1 1/2-3	3375b	Co-K. . . . .	4 1/2 x 5 1/2	B-L. . . . .	B-L. . . . .	Ti-6500	W.O.	36x4	36x4d	Federal. . . . .	TT 1	Cov. . . . .	33x4	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	36x5	36x4				
Attorbury. . . . .	22D 3 1/2-4	4275b	Co-L. . . . .	4 1/2 x 5 1/2	B-L. . . . .	B-L. . . . .	Ti-6600	W.O.	36x5	40x6	G.M.C. . . . .	K 16 1	Cov. . . . .	31 1/2 x 5 1/2	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	SB. . . . .	34x5n	34x5n			
Attorbury. . . . .	8E 5-6	4975b	Co-B. . . . .	4 1/2 x 6	B-L. . . . .	B-L. . . . .	Ti-6700	W.O.	36x6	40x7	G.M.C. . . . .	K 41 2	Cov. . . . .	31 1/2 x 5 1/2	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	Ti-6560	W.O.	36x4			
Autocar. . . . .	21 1 1/2-2	2207	Own. . . . .	4 1/2 x 4	Own. . . . .	Own. . . . .	DR	34x4	34x6	††G.M.C. . . . .	K 41 2	Cov. . . . .	31 1/2 x 5 1/2	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	Ti-6560	W.O.	36x4				
Autocar. . . . .	27 2 1/2	3100	Own. . . . .	4 1/2 x 5	Own. . . . .	Own. . . . .	DR	34x5	36x8	G.M.C. . . . .	K 71 3 1/2	Cov. . . . .	4 1/2 x 6	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	Ti-6660	W.O.	36x5				
Autocar. . . . .	26 4-6	4200	Own. . . . .	4 1/2 x 5	Own. . . . .	Own. . . . .	DR	34x6	36x12	G.M.C. . . . .	K 71 3 1/2	Cov. . . . .	4 1/2 x 6	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	Ti-6760	W.O.	40x12				
Available. . . . .	JH 1 1/2	2450	He-O. . . . .	4x5	—	—	—	—	—	G.M.C. . . . .	K 101 5	Cov. . . . .	4 1/2 x 6	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	Ti-6760	W.O.	36x5				
Available. . . . .	H 1 1/2	3180	He-CU3	4x5 1/2	B-L. . . . .	B-L. . . . .	Ti-6500	W.O.	36x4	36x8	G.M.C. . . . .	K 101 5	Cov. . . . .	4 1/2 x 6	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	Ti-6760	W.O.	40x14			
Available. . . . .	H 3 1/2	4175	He-MU 3	4 1/2 x 5 1/2	B-L. . . . .	B-L. . . . .	Ti-6600	W.O.	36x5	40x6d	G. W. W. . . . .	W 1/2	Cov. . . . .	31 1/2 x 5 1/2	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	SB. . . . .	35x5n				
Available. . . . .	H 5	5375	He-T 3	5x6	B-L. . . . .	B-L. . . . .	Ti-6700	W.O.	36x6	40x12	G. W. W. . . . .	W 1/2	Cov. . . . .	31 1/2 x 5 1/2	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	SB. . . . .	35x5n				
Avery. . . . .	1-1 1/2	—	Own. . . . .	3x4	—	—	—	—	—	G. M. C. . . . .	K 16 1	Cov. . . . .	31 1/2 x 5 1/2	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	SB. . . . .	34x5n	34x5n				
Bessemer. . . . .	G 1	1450	Co-N. . . . .	3 1/2 x 5	Ful. . . . .	Ful. . . . .	To-A. . . . .	IG. . . . .	34x5n	35x5n	G. M. C. . . . .	K 41 2	Cov. . . . .	31 1/2 x 5 1/2	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	Ti-6560	W.O.	36x7			
Bessemer. . . . .	H 2 1/2	1995	Co-N. . . . .	3 1/2 x 5	B&B. . . . .	B&B. . . . .	Bak. . . . .	LM-7150	DR	36x3 1/2	G. M. C. . . . .	K 70H	Cov. . . . .	4 1/2 x 5 1/2	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	Ti-6560	W.O.	36x4			
Bessemer. . . . .	J 2 1/2	2895	Co-C. . . . .	4 1/2 x 5 1/2	B-L. . . . .	B-L. . . . .	LM-7250	DR	36x4	36x12	G. M. C. . . . .	K 70H	Cov. . . . .	4 1/2 x 5 1/2	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	Ti-6560	W.O.	40x5d			
Bethlehem. . . . .	KN 1-1 1/2	1385	Own. . . . .	3 1/2 x 5	B&B. . . . .	B&B. . . . .	Det. . . . .	Ea-3070	SB.	35x5n	Kalama. . . . .	G 15 1	Cov. . . . .	31 1/2 x 5 1/2	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	Ti-6250	W.O.	34x5n			
Bethlehem. . . . .	GN 2-2 1/2	2185	Own. . . . .	3 1/2 x 5	B&B. . . . .	B&B. . . . .	Det. . . . .	Ea-3080	SB.	35x5n	Kalama. . . . .	G 25 1/2	Cov. . . . .	31 1/2 x 5 1/2	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	Ti-6250	W.O.	34x5n			
Bethlehem. . . . .	HN 3-3 1/2	2995	Own. . . . .	3 1/2 x 5	B&B. . . . .	B&B. . . . .	Det. . . . .	Ea-3090	SB.	35x5n	Kalama. . . . .	G 25 1/2	Cov. . . . .	31 1/2 x 5 1/2	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	Ti-6250	W.O.	34x5n			
Brockway. . . . .	E 2 1/2	—	Wi-SU	4x5	B-L. . . . .	B-L. . . . .	Ti-6200	W.O.	36x7	40x7d	Kalama. . . . .	G 25 1/2	Cov. . . . .	31 1/2 x 5 1/2	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	Ti-6250	W.O.	34x5n			
Brockway. . . . .	K 2 1/2	—	Wi-SU	4x5	B-L. . . . .	B-L. . . . .	Ti-6400	W.O.	36x4	36x8	Kalama. . . . .	G 25 1/2	Cov. . . . .	31 1/2 x 5 1/2	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	Ti-6250	W.O.	36x7			
Brockway. . . . .	R 3 1/2	—	Co-K. . . . .	4 1/2 x 5 1/2	B-L. . . . .	B-L. . . . .	Ti-6600	W.O.	36x5	36x5d	Kalama. . . . .	G 25 1/2	Cov. . . . .	31 1/2 x 5 1/2	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	Ti-6250	W.O.	36x8			
Brockway. . . . .	T 5	945	Own. . . . .	3 1/2 x 5 1/2	TD. . . . .	TD. . . . .	Own. . . . .	To-C-139	IG. . . . .	36x6	36x8	Kalama. . . . .	G 25 1/2	Cov. . . . .	31 1/2 x 5 1/2	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	Ti-6250	W.O.	36x8		
Case. . . . .	TR 2	—	Own. . . . .	3 1/2 x 5 1/2	TD. . . . .	TD. . . . .	Own. . . . .	To-C-139	IG. . . . .	36x6	38x7n	Kalama. . . . .	G 25 1/2	Cov. . . . .	31 1/2 x 5 1/2	Own. . . . .	Own. . . . .	Own. . . . .	Own. . . . .	Ti-6250	W.O.	36x8		
Chevrolet. . . . .	Sup' 1	575	Own. . . . .	3 1/2 x 4	Own. . . . .	Own. . . . .	Own. .																	

## Current Motor Truck Specifications—Continued

(This list comprises trucks distributed on a national basis)

MAKE AND MODEL	Tons Capacity	Price	ENGINE			REAR AXLE	TIRES	MAKE AND MODEL	Tons Capacity	ENGINE			REAR AXLE	TIRES							
			Make & Model	Bore & Stroke	Clutch Make			Make & Model		Make & Model	Bore & Stroke	Clutch Make									
Larrabee...X2	1-1/4	\$1865	Co-8R...	33/4x5 1/2	B-L.	Sa-1480	SB.	34x5	34x5n	Sandow...	M 5	\$4325	Co-B5...	43/4x6	B-L.	Ti-6760...	WO.	36x6	40x12		
Larrabee...J4	1 1/2-2 1/4	2400	Co-J4...	33/4x5	B-L.	Sh-1501	WO.	31x3 1/2	34x5k	Sanford...	10	33/4x1 1/2	Co-SR4...	33/4x1 1/2	B&B.	Sa-D...	SB.	33x5n	33x5n		
Larrabee...K5	2 1/2-3 1/2	3400	Co-L4...	41/2x5 1/2	B-L.	Sh-22...	WO.	36x4	36x8	Sanford...	15	1 1/2-2	Co-N...	33/4x5	B-L.	Sh-1501...	WO.	36x3 1/2	36x5k		
Larrabee...L4	3 1/2-4 1/2	4000	Co-L4...	41/2x5 1/2	B-L.	Sh-31...	WO.	36x5	36x10	Sanford...	25	2 1/2-3	Co-C4...	41/2x5 1/2	B-L.	Sh-21...	WO.	36x4k	36x4d		
Maccar...	G 5-6									Sanford...	35	3 1/2-5	Co-E4...	41/2x5 1/2	B&B.	Sh-31...	WO.	36x5	36x5d		
MacDonald...O	3-5	5500b	Bu-WTU	33/4x5 1/2	B-L.	B-L.	**Own.	IG.	36x6	36x10	Sanford...	50	5-7	Co-E4...	41/2x5 1/2	B-L.	Sh-51...	WO.	36x5	40x6d	
MacDonald...A	7 1/2	8000b	Bu-YTU	41/2x6	B-L.	B-L.	**Own.	IG.	40x7	40x14	Schacht...	1 1/2	2500	Wi...	4x5	Ful.	Wl...	DR.	36x3 1/2	36x7k	
Mack...AB	11 1/2	3000	Own.	4x5	Own.	Own.	Ch.	36x4	36x13 1/2	Schacht...	2	3200	Wi-UAU	41/2x6	B&B.	Own.	Own.	WO.	36x4	36x7	
Mack...AB	11 1/2	3450	Own.	4x5	Own.	Own.	DR.	36x4	36x14	Schacht...	3	3800	Wi-UAU	41/2x6	B&B.	Own.	Own.	WO.	36x5	36x5d	
Mack...AB	12	3300	Own.	41/4x5	Own.	Own.	DR.	36x4	36x14	Schacht...	4	4400	Wi-YAU	41/2x6	B&B.	Own.	Own.	WO.	36x5	40x6d	
Mack...AB	2	3750	Own.	41/4x5	Own.	Own.	DR.	36x4	36x14	Schacht...	5	4600	Wi-YAU	41/2x6	B&B.	Own.	Own.	WO.	36x5	40x7d	
Mack...AB	2 1/2	3100	Own.	41/4x5	Own.	Own.	DR.	36x4	36x14	Schacht...	7	5050	Wi-YAU	41/2x6	B&B.	Own.	Own.	WO.	36x6	40x8	
Mack...AC	3 1/2	3850	Own.	41/4x5	Own.	Own.	DR.	36x5	40x5d	Schacht...	8	1685	Ly-KB	31/2x5	Ful.	Ful.	Ea-1000.	SB.	34x4 1/2	34x1 1/2	
Mack...AC	5	4950	Own.	5x6	Own.	Own.	Ch.	36x6	40x6d	Schacht...	9	22W	Bu-CTU	33/4x5 1/2	Ful.	Ful.	Sh-1501.	WO.	34x3 1/2	34x6	
Mack...AC	5 1/2	5500	Own.	5x6	Own.	Own.	Ch.	36x6	40x6d	Schacht...	10	22W	Bu-HTU	41/2x5 1/2	Ful.	Ful.	Sh-21...	WO.	36x4	36x8	
Mack...AC	6 1/2	5750	Own.	5x6	Own.	Own.	Ch.	36x6	40x12	Schacht...	11	22W	Bu-YTU	41/2x6	Ful.	Ful.	Sh-31...	WO.	36x6	36x12	
Mack...AC	7 1/2	6000	Own.	5x6	Own.	Own.	Ch.	36x7	40x12	Schacht...	12	2375	Co-N...	33/4x5	B-L.	Ti...	WO.	34x3 1/2	34x5k		
Mack...AC	8	1200	He...	Hoo.	Fl...	SB.	34x5	35x5n	Service...	30C	23250	Co-K4...	41/2x5 1/2	B-L.	Ti...	WO.	36x4k	36x7k			
Master...JW	1 1/2-2	2290	Bu-OU	41/4x5	Ful.	Ti-6400	WO.	34x4	31x5	Service...	50B	3550	Co-L4...	41/2x5 1/2	B-L.	Ti...	WO.	36x4k	36x7k		
Master...DD	2 1/2-3	3190	Bu-BU	41/4x5	Ful.	Wa-25A	IG.	31x4	36x8	Service...	53B	3550	Co-L4...	41/2x5 1/2	B-L.	Ti...	WO.	36x4k	36x7k		
Master...W	2 1/2-3	2930	Bu-BU	41/4x5 1/2	Ful.	Ti-6560	WO.	34x4	36x8	Service...	70B	4175	Co-L4...	41/2x5 1/2	B-L.	Ti...	WO.	36x5	36x10k		
Master...B	5	3990	Bu-YTU	41/4x6	B-L.	Ti-6666	WO.	36x6	40x5d	Service...	73	4475	Co-B5...	43/4x6	B-L.	Ti...	WO.	36x5	36x10k		
Master...F	5	4990	Bu-ATU	41/4x6 1/2	B-L.	Ti-6760	WO.	36x6	40x6d	Service...	75	4950	Co-B5...	43/4x6	B-L.	Ti...	WO.	36x6	40x12		
Maxwell...1 1/2	930	Own.	33/4x5 1/2	Own.	Own.	Ti...	35x5n	35x5n	Service...	90A	1093	Co-N...	33/4x5	B-L.	Ti...	WO.	36x6	40x6d			
Menominee...B 1	1650	Wi-SU...	4x5	B&B.	Det.	Co-5200	SB.	35x5n	35x5n	Service...	90A	1093	Co-N...	33/4x5	B-L.	Ti...	WO.	36x5	40x6d		
Menominee...HT	1 1/4	2000	Wi-FAU	33/4x5	Ful.	Det.	Wi-800G	SB.	31x3 1/2	36x5k	Service...	90B	12795	Co-K4...	41/2x5 1/2	B-L.	Ti...	WO.	34x5n	34x5n	
Menominee...D	1 1/2-2	2475	Wi-EAU	4x5	Ful.	Det.	Wi-800H	WO.	36x3 1/2	36x5k	Service...	90C	13615	Co-L4...	41/2x5 1/2	B-L.	Ti...	WO.	36x5	36x12	
Menominee...D	2 1/2-3	2875	Wi-TAU	4x6	Ful.	Det.	Wi-800J	WO.	36x4	36x8	Service...	90D	14995	Co-B5...	43/4x6	B-L.	Ti...	WO.	36x5	40x14	
Menominee...J	5	4850	Wi-RAU	41/4x8	B&B.	Det.	Ti-6760	WO.	36x6	40x12	Star...	1	610b	Co...	33/4x4 1/2	Own.	War.	TI.	30x3 1/2	30x3 1/2	
Moline...10	1 1/2	1695	Own.	31/2x5 1/2	B&B.	Own.	To-A...	IG.	31x5n	36x6n	Star...	2	3240f	Wa-FU	41/2x5	B-L.	Ti...	WO.	33x5n	33x5n	
Moreland...R.R.1	1595	He-O...	4x5	B-L.	Ti-5512	WO.	34x5n	34x5n	Star...	3	3440f	Wa-FU	41/2x5	B-L.	Ti...	WO.	33x4k	33x5k			
Moreland...BX	1 1/2	1980	He-O...	4x5	B-L.	Ti-6461	WO.	36x3 1/2	36x6	Star...	4	3700f	Wa-CU	41/2x5	B-L.	Ti...	WO.	36x5	36x4k		
Moreland...EX	2	2625	Co-K4...	41/4x5 1/2	Own.	Ti-6161	WO.	36x4	36x8	Star...	5	4750f	Wa-DU	41/2x6	B-L.	Ti...	WO.	36x6	40x5d		
Moreland...AX	3	3500	Co-L4...	41/4x5 1/2	Own.	Ti-6560	WO.	36x5	36x10	Star...	6	5409f	Wa-EU	5x6 1/2	H-S.	Own.	Own.	Ch.	36x6	40x6d	
Moreland...RX	5	4600	Co-B5...	41/4x6	Own.	Ti-6666	WO.	36x6	40x12	Star...	7	6000f	Wa-EU	5x6 1/2	H-S.	Own.	Own.	Ch.	36x6	40x7d	
Nash...2018	1-1 1/2	1595	Own.	33/4x5 1/2	B&B.	Det.	Cl-1D...	IG.	34x4	34x5	Stewart...	1	990	Co-B5...	43/4x5	B-L.	Ti...	WO.	34x4 1/2	34x4 1/2	
Nash...4017F	2 1/2-2	2750	Bu-HU	41/4x5	B&B.	Own.	IG.	36x6	36x8	Stewart...	15	1445	Bu-MU	33/4x5 1/2	Ful.	Cl-AW.	IG.	35x5n	35x5n		
Nash...3018	2 1/2-2	2150	Own.	33/4x5 1/2	B&B.	Det.	Cl-2D...	IG.	34x4	31x7	Stewart...	14X	1245	Bu-MU	33/4x5 1/2	B&B.	Dur.	Cl-AW.	IG.	34x4 1/2	34x4 1/2
Nash...5018	2 1/2	2250	Own.	33/4x5 1/2	B&B.	Det.	Cl-2D...	IG.	34x4	31x7	Stewart...	9	1790	Co-N...	33/4x5	B-L.	Ful.	Cl-1D...	IG.	34x4	36x8
Noble...A-21	1 1/2-2	1750	Bu-MU	33/4x5 1/2	Ful.	Det.	Sh-1501	WO.	34x5n	35x5n	Stewart...	7	2390	Bu-HTU	41/2x5 1/2	Ful.	Cl-2D...	IG.	34x4	36x8	
Noble...B-31	1 1/2-2	2395	Bu-CTU	33/4x5 1/2	Ful.	Det.	Ti-103	WO.	36x4	36x7	Stewart...	10X	3190	Bu-YTU	41/2x6	Ful.	Cl-3D...	IG.	36x5	36x12	
Noble...D-51	2 1/2-3	2795	Bu-HTU	41/4x5 1/2	Ful.	Det.	Sh-21	WO.	36x4	36x8	Stoughton...	C 4-1/2	1093	Co-410	33/4x4 1/2	Del.	Cam.	Co-5200	SB.	34x4 1/2	34x4 1/2
Noble...E-71	3 1/2-5	3195	Bu-YTU	41/4x6	Ful.	Det.	Sh-30	WO.	36x5	36x10	Stoughton...	A 1/2	1790	Bu-WA	33/4x5 1/2	B-L.	Sh-1001	WO.	34x5n	34x5n	
Old Reliable...B	2 1/2	3500	Wi-UAU	41/4x6	Ful.	Det.	Sh-21	WO.	34x4	36x8	Stoughton...	B 1/2	2150	Bu-WA	33/4x5 1/2	B-L.	Sh-103	WO.	36x4	36x7	
Old Reliable...D	3 1/2	4250	Wi-VAU	41/4x6	Ful.	Det.	Sh-31	WO.	36x5	36x12	Stoughton...	C 2-3	2150f	Co-B5...	43/4x5	B-L.	Ti...	WO.	36x5	36x12	
Old Reliable...D	5	5000	Wi-RAU	41/4x6	Own.	B-L.	Sh-51	WO.	36x6	40x12	Stewart...	26	2700	Co-C4...	41/2x5 1/2	Ful.	Cl-1D...	IG.	34x3 1/2	34x6	
Old Reliable...K	7 1/2	6000	Wa-P...	43/4x6 1/2	Own.	Own.	Ch.	36x6	40x14	Stewart...	27	3200	Co-C4...	41/2x5 1/2	Ful.	Cl-2D...	IG.	34x4	36x8		
Oldsmobile...T	1	1095	Wa-P...	31/2x5 1/2	B&B.	War.	To-OX2L	IG.	35x5n	35x5n	Stewart...	28	3600	Co-B2...	41/2x6	B&B.	Cot.	Sh-51...	WO.	36x6	10x12
Oneida...	B 1/2-2	2825	Hi-400	41/4x5	Ful.	Det.	Wi-800J	WO.	36x3 1/2	36x7	Stewart...	29	4300	Co-B2...	41/2x6	B&B.	Cot.	Sh-51...	WO.	36x6	36x8
Oneida...	C 1/2	3200	Hi-400	41/4x5	Ful.	Det.	Wa-900	WO.	36x4	36x7	Stewart...	30	4500f	Co-B2...	41/2x6	B&B.	Cot.	Sh-51...	WO.	36x6	36x12
Oneida...	D 1/2	4050	Hi-200	41/4x5 1/2	Ful.	Det.	Ti-6666	WO.	36x5	36x10	Stewart...	31	4500f	Co-B2...	41/2x6	B&B.	Cot.	Sh-51...	WO.	36x6	36x12
Overland...AD	1/2	425	Own...	33/4x4	B&B.	Own.	Own...	SB.	30x3 1/2	30x3 1/2	Stewart...	32	3600	Bu-YTU	41/2x5 1/2	Ful.	Cl-1D...	IG.	34x3 1/2	34x6	
Packard...EC	2-3	3100f	Own...	41/4x5 1/2	Own.	Own.	...WO.	36x4	36x7	Stewart...	33	3600	Co-C4...	41/2x5 1/2	Ful.	Cl-1D...	IG.	34x3 1/2	34x6		
Packard...EX	2 1/2	3500	Own...	41/4x5 1/2	Own.	Own.	...WO.	36x5	36x5d	Stewart...	34	3700	Co-C4...	41/2x5 1/2	Ful.	Cl-1D...	IG.	34x			

## Current Motor Truck Specifications—Continued

(This list comprises trucks distributed on a national basis)

MAKE AND MODEL	Tons Capacity	Price	ENGINE			Gearset Make	REAR AXLE		TIRES		MAKE AND MODEL	Tons Capacity	Price	ENGINE			Gearset Make	REAR AXLE		TIRES		
			Make & Model	Bore & Stroke	Clutch Make		Make & Model	Final Drive	Front	Rear				Make & Model	Bore & Stroke	Clutch Make		Final Drive	Front	Rear		
Walter.....N 2	\$3600	Own. 4x5 <sup>1</sup> / <sub>2</sub>	B-L. B-L.	Own. DR. 36x4	36x8									Gotfredson.....20	3 <sup>1</sup> / <sub>2</sub> -1	\$1685	Bu-WTU	33 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	B-L. B-L.	Ti-6250. WO.	34x5n	34x5n
Walter.....S 5	5100	Own. 4 <sup>1</sup> / <sub>2</sub> x6 <sup>1</sup> / <sub>2</sub>	B-L. War. Own. DR. 36x6	40x6d			Gotfredson.....40	1 <sup>1</sup> / <sub>2</sub> -2	2300	Bu-GTU	45x5 <sup>1</sup> / <sub>2</sub>	B-L. B-L.	Ti-6160. WO.	36x6n	38x7n							
White.....15 3/4	2400	Own. 3 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	Own. Own. SP. 34x5n	34x5n			Gotfredson.....5	2 <sup>1</sup> / <sub>2</sub> -2	3000	Bu-EU	4 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	B-L. B-L.	Ti-6560. WO.	36x4	36x8							
White.....20 2	3250	Own. 3 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	Own. Own. DR. 36x4	36x7d			Gotfredson.....80	1 <sup>1</sup> / <sub>2</sub> -1	3975	Bu-YTU	4 <sup>1</sup> / <sub>2</sub> x6	B-L. B-L.	Ti-6665. WO.	34x5	36x12							
White.....40 3/4	4200	Own. 4 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	Own. Own. DR. 36x5	40x5d			Gotfredson.....100	5	4800	Bu-BTU	5x6 <sup>1</sup> / <sub>2</sub>	B-L. B-L.	Ti-6760. WO.	36x6	40x14							
White.....45 5	4500	Own. 4 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	Own. Own. DR. 36x6	40x6d			Mapleleaf.....1 <sup>1</sup> / <sub>2</sub>	3000	Hi-300.	33 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	Ful. Ful.	Sh-1501. WO.	34x5n	36x6n								
Wilcox.....AA 1	1900	Bu-CTU	33 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	B-L. B-L. Bu-3600. SP. 35x5	35x5			Mapleleaf.....AA 2	3600	Hi-400.	4x5 <sup>1</sup> / <sub>2</sub>	Ful. Ful.	Sh-103. WO.	36x4	36x7							
Wilcox.....BB 1 <sup>1</sup> / <sub>2</sub>	2550	Own. 4 <sup>1</sup> / <sub>2</sub> x5	B&B. Own. Wa-2A. DR. 36x6	38x7k			Mapleleaf.....BB 3	4050	Hi-500.	4 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	Ful. Ful.	Sh-21. WO.	36x4	36x4d								
Wilcox.....CC 2 <sup>1</sup> / <sub>2</sub>	.....	Own. 4 <sup>1</sup> / <sub>2</sub> x5	B&B. Own. Wa-25A. DR. 36x6k	40x8k			Mapleleaf.....CC 4	4800	Hi-200.	4 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	Ful. Ful.	Sh-31. WO.	36x5	36x5d								
Wilcox.....EE 3 <sup>1</sup> / <sub>2</sub>	3950	Bu-YTU	4 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	M&E. Own. Wa-5A. DR. 36x5	36x10			Mapleleaf.....DD 5	5624	Hi-160.	4 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	Ful. Ful.	Sh-51. WO.	36x6	36x6d							
Wilcox.....F 5	4350	Bu-ATU	4 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	M&E. Own. Wa-5A. DR. 36x5	40x5			National.....FA 1	.....	Wa-BUX	33 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	B-L. B-L.	Ti-6460. WO.	31x4k	34x6k							
Wilson.....C 1	.....	Co-J4.	3 <sup>1</sup> / <sub>2</sub> x5	B&B. Det. Ti-6532. WO. 34x5n	31x5n			National.....GA 1 <sup>1</sup> / <sub>2</sub>	.....	Wa-BUX	33 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	B-L. B-L.	Ti-6560. WO.	36x5	36x10							
Wilson.....F 1 <sup>1</sup> / <sub>2</sub>	2270	Co-J4.	3 <sup>1</sup> / <sub>2</sub> x5	B&B. Cot. Ti-3440. WO. 36x3 <sup>1</sup> / <sub>2</sub> k	36x5k			National.....HD 2 <sup>1</sup> / <sub>2</sub>	.....	Wa-CU	4 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	H-S. B-L.	Ti-6666. WO.	36x6	40x12							
Wilson.....EA 2 <sup>1</sup> / <sub>2</sub>	2825	Co-K4.	4 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	B&B. Cot. Ti-6560. WO. 36x4k	36x7k			National.....NB 3 <sup>1</sup> / <sub>2</sub>	.....	Wa-DU	4 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	B-L. B-L.	Ti-6760. WO.	36x7	40x14							
Wilson.....G 3 <sup>1</sup> / <sub>2</sub>	3685	Co-L4.	4 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	B&B. Cot. Ti-6660. WO. 36x5k	36x5dk			National.....OA 5	.....	Wa-EU	5x6 <sup>1</sup> / <sub>2</sub>	H-S. B-L.	Ti-6860. WO.	34x5	34x5d							
Wilson.....H 5	4520	Co-B2.	4 <sup>1</sup> / <sub>2</sub> x6	B&B. Cot. Ti-6752. WO. 36x6k	40x6dk			Veteran.....P 1	269	Bu-CTU	33 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	B&B. Cot.	Sh-1501. WO.	34x5n	34x5n							
Yellow Cab.....M 22 3/4	1590	Co-V4.	3 <sup>1</sup> / <sub>2</sub> x5	B-L. B-L. Ti-6752. SB. 33x4 <sup>1</sup> / <sub>2</sub> n	33x4 <sup>1</sup> / <sub>2</sub> n			Veteran.....P 2	3699	Bu-HTU	4 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	B&B. Cot.	Sh. WO.	36x4	36x7							
Yellow Cab.....M 42 1 <sup>1</sup> / <sub>2</sub>	1640	Co-V4.	3 <sup>1</sup> / <sub>2</sub> x5	B-L. B-L. Ti-6352. WO. 35x5n	35x5n			Veteran.....R 3	4200	Bu-HTU	4 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	B&B. Cot.	Sh-21. WO.	36x4	36x7							
								Veteran.....S 4	5395	Bu-YTU	4 <sup>1</sup> / <sub>2</sub> x6	B&B. Cot.	Sh-31. WO.	36x5	36x10							

## Current Tractor Specifications

MAKE & MODEL	Drawbar-Pulley Rating	Recommended No. of 14 In. Plows	Price	ENGINE			Dimensions Dia. & Face (In.)	Weight (Lbs.)	Dimensions Dia. & Face (In.)	Type Final Drive	TRACTION MEMBERS	MAKE & MODEL	Drawbar-Pulley Rating	Recommended No. of 14 In. Plows	Price	ENGINE			Dimensions Dia. & Face (In.)	Weight (Lbs.)	TRACTION MEMBERS	
				Make	No. of Cyls	Bore & Stroke							MAKE & MODEL			Make	No. of Cyls	Bore & Stroke				
Allis-Chalmers.....6-12 1	1	8295	LeR. 4-3 <sup>1</sup> / <sub>2</sub> x4 <sup>1</sup> / <sub>2</sub>	G.	10	x 5 <sup>1</sup> / <sub>2</sub>	2,500	48x 6	W				McCormick-Deering.....10-20 2	2	\$785	Own. 4-4 <sup>1</sup> / <sub>2</sub> x5	GKD.	15 <sup>1</sup> / <sub>2</sub> x 7	3,700	42x12	W	
Allis-Chalmers.....15-25 3	3	1185	Mid. 4 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	G.	12 <sup>1</sup> / <sub>2</sub> x 6 <sup>1</sup> / <sub>2</sub>	4,700	46x12	W								16 <sup>3</sup> / <sub>2</sub> x 8	5,750	50x12	WW			
Allis-Chalmers.....20-35 4	4	1885	Own. 4 <sup>1</sup> / <sub>2</sub> x6 <sup>1</sup> / <sub>2</sub>	GK.	13	x 7 <sup>1</sup> / <sub>2</sub>	6,150	50x12	W				McCormick-Deering.....15-30 3	3	1250	Own. 4-4 <sup>1</sup> / <sub>2</sub> x6	GKD.	16 <sup>3</sup> / <sub>2</sub> x 8	6,600	50x12	WW	
Allis-Chalmers.....Allwork.....G 14-28 3	3	1495	Own. 4 <sup>1</sup> / <sub>2</sub> x6 <sup>1</sup> / <sub>2</sub>	GK.	11	x 7	4,800	48x12	W				Minneapolis.....12-25 3	3	1250	Own. 4-4 <sup>1</sup> / <sub>2</sub> x7	GKD.	12 <sup>1</sup> / <sub>2</sub> x 7	6,400	54x12	WW	
Allis-Chalmers.....Allwork.....C 16-30 3	3	1293	Own. 4 <sup>1</sup> / <sub>2</sub> x6 <sup>1</sup> / <sub>2</sub>	GK.	13	x 7 <sup>1</sup> / <sub>2</sub>	5,200	48x12	W				Minneapolis.....17-30 3	4	2400	Own. 4-4 <sup>1</sup> / <sub>2</sub> x7	GKD.	12 <sup>1</sup> / <sub>2</sub> x 7	12,410	62x20	WW	
Allis-Chalmers.....Aultman-Taylor.....C 16-30 3	3	1900	Chl. 4 <sup>1</sup> / <sub>2</sub> x6 <sup>1</sup> / <sub>2</sub>	GK.	20	x 11	12,500	70x20	W				Minneapolis.....22-44 3	5	2400	Own. 4-4 <sup>1</sup> / <sub>2</sub> x7	GKD.	22 <sup>1</sup> / <sub>2</sub> x 9	22,500	85x30	WW	
Allis-Chalmers.....Aultman-Taylor.....C 24-45 4-6	4	3100	Own. 4 <sup>1</sup> / <sub>2</sub> x28	GKD.	20	x 11	22,500	90x24	W				Moline (Un.).....D 3	9-8	2-3	725	Own. 4-4 <sup>1</sup> / <sub>2</sub> x7	G.	9 x 6 <sup>1</sup> / <sub>2</sub>	4,103	52x 8	TT
Allis-Chalmers.....Aultman-Taylor.....C 30-60 8-10	8-10	4400	Own. 4 <sup>1</sup> / <sub>2</sub> x7	GKD.	16	x 7	7,500	60x16	W				Moline (Ore.).....D 9-8	2-3	725	Own. 4-3 <sup>1</sup> / <sub>2</sub> x5	G.	9 x 6 <sup>1</sup> / <sub>2</sub>	3,933	44x 8	WW	
Avery.....15 15-15 3-4	3	.....	Own. 4 <sup>1</sup> / <sub>2</sub> x6	GKD.	16	x 7	4,750	50x12	W				Monarch.....C 20-30 4	3	3,700	Bea. 4 <sup>1</sup> / <sub>2</sub> x6	GKD.	16 x 8 <sup>1</sup> / <sub>2</sub>	12,000	67x12	TT	
Avery.....20-35 20-35 4-5	4	.....	Own. 4 <sup>1</sup> / <sub>2</sub> x7	GKD.	16	x 7	7,500	60x16	W				Monarch.....D 35-60 5	5	5,500	Bea. 4 <sup>1</sup> / <sub>2</sub> x6	GKD.	15 <sup>1</sup> / <sub>2</sub> x 7	15,000	89x12	TT	
Avery.....25-50 25-50 5-6	5	.....	Own. 4 <sup>1</sup> / <sub>2</sub> x7	GKD.	22	x 8	12,500	69x20	W				Nichols-Shepard.....20-42 6	4	2,600	Own. 4 <sup>1</sup> / <sub>2</sub> x6	GKD.	22 x 8	13,500	64x20	WW	
Avery.....45-65 45-65 8-10	8-10	.....	Own. 4 <sup>1</sup> / <sub>2</sub> x8	GKD.	26	x 10	22,000	87x24	W				Nichols-Shepard.....25-50 6-8	3	3,320	Own. 4 <sup>1</sup> / <sub>2</sub> x6	GKD.	22 x 9	20,500	69x28	WW	
Avery.....Tr. Runner.....3	3	.....	Own. 4 <sup>1</sup> / <sub>2</sub> x5	GKD.	12	x 6 <sup>1</sup> / <sub>2</sub>	5,000	x 8 <sup>1</sup> / <sub>2</sub>	T				Nichols-Shepard.....35-70 8-12	4	4,030	Own. 2-10 <sup>1</sup> / <sub>2</sub> x14	GKD.	30 x 12	30,000	73x32	WW	
Bates (St. Mule).....H 15-25 3	3	.....	Mid. 4-6 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	G.	12	x 8	3,600	48x10	W				Pioneer.....G 18-36 4	4	3,000	Own. 4-5 <sup>1</sup> / <sub>2</sub> x6	GKD.	6,500	60x18	WW		
Bates (St. Mule).....F 18-25 3	3	.....	Mid. 4-6 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	G.	12	x 8	3,600	56x11 <sup>1</sup> / <sub>2</sub>	W				Pioneer.....H 40-75 10	10	24,000	96x24	GKD.	17 <sup>1</sup> / <sub>2</sub> x 15	24,000	W		
Bates (St. Mule).....F 25-35 4	4	.....	Mid. 4-6 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	G.	12	x 8	4,850	56x10	W				Rumely OilPull.....16-20 3	3	2,720	Own. 4 <sup>1</sup> / <sub>2</sub> x6	GKD.	19 x 7	6,682	51x12	WW	
Bates (St. Mule).....F 30-40 4	4	.....	Mid. 4-6 <sup>1</sup> / <sub>2</sub> x5 <sup>1</sup> / <sub>2</sub>	G.	16	x 10	18,580	89x20	T				Rumely OilPull.....20-40 6	6	6,000	Own. 4 <sup>1</sup> / <sub>2</sub> x6	GKD.	23 x 8 <sup>1</sup> / <sub>2</sub>	9,600	56x16	WW	
Bates (St. Mule).....F 40-72 10-12 3	3	2,975	Own. 4 <sup>1</sup> / <sub>2</sub> x6 <sup>1</sup> / <sub>2</sub>	G.	12	x 8	8,100	68x11 <sup>1</sup> / <sub>2</sub>	W				Rumely OilPull.....20-40 10-12 3	6	6,000	Own. 4 <sup>1</sup> / <sub>2</sub> x6	GKD.	26 x 9	12,320	64x20	WW	
Caterpillar.....2 Ton 3	4	3975	Own. 4 <sup>1</sup> / <sub>2</sub> x6 <sup>1</sup> / <sub>2</sub>	G.	12	x 8 <sup>1</sup> / <sub>2</sub>	9,400	48x12	W													

## Current Passenger Car Specifications

(This list comprises cars distributed on a national basis)

PRICES										NAME AND MODEL	ENGINE			ELECTRICAL SYSTEM	GEARSET MAKE	UNIVERSAL TYPE AND MAKE	REAR AXLE				
OPEN MODELS			CLOSED MODELS			WHEEL BASE (In.)	MADE	NO. OF CYL. BORE AND STROKE	HORSE POWER RATING (N.A.A.C.)	CARBURETOR MAKE	GENERATOR AND STARTER MAKE	IGNITION MAKE									
2-3 Pass.	4-5 Pass.	6-7 Pass.	Sport Models	2-3 Pass.	4-5 Pass.	6-7 Pass.	TIRE SIZE (In.)†														
\$1950c	\$1785	\$1850	\$1855c	\$2250	\$2485	\$1495	127	33x4½	American.....	D-66	H-S...	6-3½x5	29.40	Strom...	G-D...	A-K...	B & B...	m Hartford...	F Salis...	4.50	
1195	1195	1395c	1395c	1495	1695	1795p	114	32x4	Anderson.....	41	Cont.	6-3½x4½	23.44	Zenith...	West...	s-p B&B...	Durston...	f Universal...	½F Salis...	4.75	
1495	1495	1595	1785b	1905c	1950d	1915c	122	32x4	Anderson.....	Series 50	Cont.	6-3½x4½	27.34	Rayfield...	Remy...	s-p B&B...	Durston...	f Universal...	½F Salis...	4.62	
1535	1535	1635	1725d	1825	1925	1915c	132	33x4	Anderson.....	Series 50	Cont.	6-3½x4½	27.34	Rayfield...	Remy...	s-p B&B...	Durston...	f Universal...	½F Salis...	4.62	
2800	2800	2900	3025	3750	3850	3850	120	32x4	Apperson.....	6	Own...	6-3½x4½	23.44	Strom...	Remy...	s-p Rockford...	Durston...	f Universal...	½F Col...	5.10	
1165	1165	1275d	1275d	1535	1535	1535	130	33x5	Apperson.....	8-23-S	Own...	8-3½x5	33.80	Johnson...	Bijur...	m-d Own...	Own...	m Own...	½F Own...	4.25	
1725	1725	1885d	1985d	2045	2345	2345	114	31x4	Auburn.....	6-43	Cont.	6-3½x4½	23.44	Strom...	Remy...	s-p B&B...	Warner...	m Detroit...	½F Col...	4.60	
1395	1395	1495d	1495d	1850	2250p	2250p	122	32x4½	Barley.....	6-63	Cont.	6-3½x4½	25.35	Strom...	Remy...	s-p B&B...	Warner...	m Theimer...	½F Col...	4.60	
865	865	725g	1175	1395	1325	1325	109	31x4	Buick.....	1923-34-5-6-7-38	Own...	4-3½x4½	18.23	Marvel...	Deleo...	m-d Own...	Own...	m Own...	½F Own...	4.66	
1175	1175	975g	1935	1985	1985	1985	118	32x4	Buick.....	1923-41-4-5-47	Own...	6-3½x4½	27.34	Marvel...	Deleo...	m-d Own...	Own...	m Own...	F Own...	4.10	
1435	1435	1625a	1675c	1895	2195	2195	124	33x4½	*Buick1923 48-9-50-45-5	Own...	6-3½x4½	27.34	Marvel...	Deleo...	m-d Own...	Own...	m Own...	F Own...	4.70		
2885	2885	2885	3675c	3950	4300s	4300s	132	33x5	Cadillac.....	61	Own...	8-3½x5½	31.25	Own...	Deleo...	m-d Own...	Own...	m Spicer...	F Tim...	Opt.	
1750	1750	2230J	2480	2575	2575	2575	122	32x4	Case.....	X	Cont.	6-3½x4½	27.34	Rayfield...	Deleo...	m-d Own...	Own...	f Sued...	½F Col...	4.66	
1185	1185	199J	1950c	2480	2975	2975	129	34x4½	Case.....	W	Own...	6-3½x5½	31.54	Rayfield...	Deleo...	m-d Own...	Own...	f Arvac...	½F Col...	4.45	
1345	1345	1445c	1595	1585	1585	1585	117	32x4	Chalmers.....	1923	Own...	6-3½x4½	25.35	Strom...	A-L...	Remy...	m-d Own...	m Hardy...	½F Adams...	5.13	
1595	1595	1785c	1785c	1785	2385	2385	122	32x4	Chalmers.....	1923	Own...	6-3½x4½	25.35	Strom...	A-L...	Remy...	m-d Own...	m Hardy...	½F Adams...	5.13	
1085	1085	1270	1270	2270	2995s	2995s	123	32x4	Chandler.....	Six	Own...	6-3½x2½	29.40	Strom...	Bosch...	s-p B&B...	Own...	f Own...	F Own...	4.45	
510	510	525	425g	680	860	860	103	30x3½	Chevrolet.....	Superior	Own...	4-3½x4	21.76	Zenith...	Remy...	s-p Own...	Own...	m Own...	½F Own...	3.77	
580	580	595	750	920	930	930	103	30x3½	Chevrolet.....	M	Own...	4-3½x3½	19.60	Carter...	Remy...	m-d Own...	Own...	m Mech...	½F Own...	4.44	
1085	1085	905	1095d	1195	1295	1295	112½	31x4	Cleveland.....	42	Own...	6-3½x4½	22.50	Strom...	Bosch...	s-p B&B...	Own...	m Mech...	½F Own...	4.90	
1885	1885	1885	2175	2750c	3075	3075	127½	33x5	Cole.....	890	Nort...	8-3½x4½	39.20	Johnson...	Deleo...	m-d North...	North...	m Spicer...	F Col...	4.70	
2175	2175	2175	2175	2750c	3075	3075	127½	38x5	Cole.....	Master	Nort...	8-3½x4½	39.20	Johnson...	Deleo...	m-d North...	Nort...	m Spicer...	F Col...	4.70	
985c	985c	1135	1395d	1295	1465	1465	115	32x4	Columbia.....	Big Six	Cont...	6-3½x4½	27.34	Strom...	A-L...	s-p B&B...	Durston...	m Spicer...	½F Tim...	4.75	
1105	1105	1105	1235	1495b	1875	1875	116	32x4	Courier.....	Falla.	Own...	6-3½x4½	23.44	Strom...	West...	A-K...	Muncie...	f Flexite...	½F Col...	5.00	
3100	3100	3130	3500c	4500	4500	4500	133	33x4½	Crawford.....	23-6-70	Cont...	6-3½x5½	31.54	Zenith...	West...	B-L...	B-L...	m Spicer...	½F Tim...	...	
5800	5800	6300	6300	6750	6750	6750	142	33x5	Crawford-Dagmar.....	6-70	Cont...	6-3½x5½	31.54	Zenith...	West...	m-d B-L...	B-L...	m Spicer...	½F Tim...	...	
4350	4350	4350	4350c	5300	5350	5350	132	33x5	Cunningham.....	V4	Own...	8-3½x4½	45.00	Strom...	Deleo...	m-d Own...	Own...	f Sued...	½F Tim...	4.23	
1295	1295	1495c	1495c	1595	1795	1795	115	31x4	Davis.....	71	Cont...	6-3½x4½	23.44	Strom...	Deleo...	s-p B&B...	Warner...	m M&E...	½F Tim...	5.10	
1595	1595	1695d	1695d	2035	2140	2140	120	32x4½	Davis.....	63	Cont...	6-3½x4½	27.34	Strom...	Deleo...	s-p B&B...	Warner...	m Peters...	½F Tim...	5.15	
850	850	880	880	980	1140	1140	114	32x4	Dodge Brothers.....	Own...	4-3½x4½	24.03	Stewart...	N.E...	m-d Own...	Own...	m Own...	½F Own...	4.16		
3950	3950	4150c	4150c	4950c	6800	6800	1310	33x5½	Dorris.....	6-80	Own...	6-4 x5	38.40	Strom...	West...	Bosch...	m-d Own...	m Spicer...	½F Tim...	4.23	
870	870	905c	905c	1240	1350	1350	108	31x4	Dort.....	23-18	Own...	4-3½x2½	19.60	Carter...	Bosch...	m-d Detlaff...	Own...	m Mech...	½F Flint...	4.66	
1010	1010	1125c	1355	1465	1465	1465	115	31x4	Dort.....	25-20	Own...	6-3½x4½	23.44	Carter...	Bosch...	m-d Detlaff...	Own...	m Mech...	½F Flint...	4.66	
5750	5750	5900	5750c	7250	7500	7500	134	33x5	Duesenberg.....	Straight 8	Own...	8-2½x5	26.45	Strom...	Deleo...	s-p Own...	Own...	f Climax...	½F Tim...	4.45	
890	890	890	1065d	1365	1365	1365	109	31x4	Durant.....	A-22	Cont...	4-3½x4½	24.03	Till...	A-L...	s-p Own...	Warner...	m Spicer...	½F Adams...	4.33	
1000	1000	1650	2250	2400	2400	2400	123½	32x4½	Durant.....	B-22	Anst...	6-3½x4½	25.35	Rayfield...	A-L...	s-p Ansted...	Warner...	m Spicer...	½F Tim...	5.15	
1485	1485	1795	1275d	1395c	1595	1595	112	32x4	Earl.....	40	Own...	4-3½x4½	18.91	Scoe...	A-L...	s-p B&B...	Warner...	m Own...	½F Own...	4.87	
965	965	1095	1095	1425	1425	1425	112	31x4	Elcar.....	4-40	Own...	4-3½x4½	21.03	Strom...	Deleo...	s-p B&B...	Warner...	m Peters...	½F Salis...	4.50	
1395	1395	1395	1595d	1975	1995	1995	118	32x4	Elcar.....	6-60	Cont...	6-3½x4½	27.34	Strom...	Deleo...	m-d Warner...	Warner...	m Spicer...	½F Salis...	4.50	
1045	1045	1145	1145	1145	1145	1145	108½	32x4	Essex.....	Own...	4-3½x5	18.23	Own...	Bosch...	m-d Own...	Warner...	m Spicer...	½F Adams...	4.66		
1195	1195	1195	1195	1895c	1985	1985	120	32x4½	Flin...	Cont...	6-3½x5	27.34	Strom...	A-L...	s-p Own...	Warner...	m Spicer...	½F Adams...	...		
269s	269s	235g	530	595	725	725	100	30x3½	Ford.....	T	Own...	4-3½x4½	22.50	Holley...	West...	A-L...	A-L...	s-p Own...	Own...	½F Own...	3.63
3900	3900	3900	4000	4900	4900	4900	132	32x4½	Fox.....	7F	Own...	6-3½x5	27.34	Zenith...	West...	Scintilla...	m-d B-L...	B-L...	m Spicer...	½F Tim...	4.90
1950	1950	1950	2750c	2750c	\$3150d	115	32x4	Franklin.....	10	Own...	6-3½x4½	25.35	Own...	A-K...	s-p B&B...	Own...	m Spicer...	½F Own...	4.73		
995	995	1145c	1145	1445	1445	1445	112	32x4	Gardner.....	Series 5	Own...	4-3½x4½	21.76	Zenith...	West...	s-p B&B...	Mech...	m Peters...	½F Flint...	4.80	
490	490	520	715	785	785	785	100	30x3½	Gray.....	Gray...	Own...	4-3½x4½	21.03	Scoe...	West...	s-p Own...	Own...	m Mech...	½F Tim...	3.90	
2250	2250	2250	2850c	2600	2600	2600	120	32x4½	H.C.S.....	Series 4	Weil...	6-3½x5½	22.50	Strom...	Deleo...	m-d B-L...	B-L...	m Spicer...	½F Own...	4.63	
2650	2650	2650	1350d	1750	1750	1750	115	32x4½	H.C.S.....	Series 6	Midw...	6-3½x5	29.40	Strom...	Deleo...	m-d B-L...	B-L...	m Spicer...	½F Own...	4.36	
1350	1350	2150	1350d	1750	1750	1750	125	32x4½	Handley.....	6-60	Midw...	6-3½x4½	23.44	Strom...	Deleo...	m-d Mech...	Deleo...	m Mech...	...	4.90	
1395	1395	1495c	1495c	2195	2195	2195	121	32x4	Hanson.....	66	Cont...	6-3½x4½	27.34	Marvin...	Deleo...	s-p B&B...	G-L...	m Universal...	F Tim...	4.66	
1345	1345	1345c	1950	1950	1950	1950	115	32x4	Hathfield.....	A-42	H-S...	6-3½x4½	19.60	Zenith...	Dyneto...	s-p B&B...	G-L...	m Spicer...	½F Col...	4.66	
1925c	1925c	1775	1975d	2175	2275	2275	115	32x4	Hathfield.....	55	H-S...	6-3½x4½	25.35	Strom...	Bosch...	s-p B&B...	Durston...	m Spicer...	½F Col...	4.63	
2395	2395	2395	2550c	3095c	3395	3395	121</														



In 1914, Cadillac first devoted itself to the manufacture of motor cars equipped with V-Type ninety degree eight-cylinder engines which would be Standard of the World.

Since that time, this Company has produced, with constant refinements, more than 150,000 V-Type eight-cylinder engines and not one

of them has ever been replaced by the factory for any reason.

Moreover, in recognition of the supremacy of the V-Type eight-cylinder principle, and of Cadillac's position as its leading exponent, more people have purchased Type 61 than all other cars combined at or above its price range.

CADILLAC MOTOR CAR COMPANY, DETROIT, MICHIGAN  
*Division of General Motors Corporation*

C A D I L L A C



*Standard of the World*

## Current Passenger Car Specifications

(This list comprises cars distributed on a national basis)

PRICES										NAME AND MODEL	ENGINE			ELECTRICAL SYSTEM		Gearset Make	REAR AXLE	
OPEN MODELS				CLOSED MODELS				Make	No. of Cyls. Bore and Stroke	Horse Power (N.A.A.C.)	Carburetor Make	Generator and Starter Make	Ignition Make	Clutch: Type and Make	Universal: Type and Make	Type and Make	Gear Ratio	
2-3 Pass.	4-5 Pass.	6-7 Pass.	Sport Models	2-3 Pass.	4-5 Pass.	6-7 Pass.	Tire Size (In.)†											
1235	\$1885	\$2385	\$2385c	.....	3375	3075	124	32x4 <sup>1</sup> <sub>2</sub>	Kissel.....45	Own. 6-3 <sup>1</sup> <sub>2</sub> x5 <sup>1</sup> <sub>2</sub>	26.38 Strom...	Remy... Remy...	m-d Warner	Warner...	m Spicer...	F Own... 3.92		
3985	4090	4090	1795	2145d	2345	5500	132	33x5	LaFayette.....	Own. 8-3 <sup>1</sup> <sub>2x5<sup>1</sup><sub>2</sub></sub>	33.80 Johnson	Deleo... Deleo	m-d Own... Conn.	Own... Warner...	m Own... f Sneed...	F Own... 4.58		
1795	(1795)	(1795)	(2095)	(2195)	(2345)	(2615)	123	32x4 <sup>1</sup> <sub>2</sub>	Lexington.....23	Own. 6-3 <sup>1</sup> <sub>2</sub> x5 <sup>1</sup> <sub>2</sub>	25.35 Rayfield	Deleo... Deleo	m-d Own...	Own... Warner...	f Salis...	F Salis... 5.10		
1575	1395	.....	1575	2085	2245	.....	117	32x4	Liberty.....10-D	Own. 6-3 <sup>1</sup> <sub>2</sub> x5	23.44 Strom...	Wagner... Wagner	s-p B&B...	Detroit...	m Spicer...	1 <sup>1</sup> <sub>2</sub> Tim... 4.80		
3800	3800c	3800	.....	4600c	4400	4900	136	33x5	Lincoln.....	Own. 8-3 <sup>1</sup> <sub>2</sub> x5	36.45 Strom...	Deleo... Deleo	m-d Own...	Own... Warner...	F Tim... 4.58			
8800	9500c	9600	.....	.....	11750	11600	142	35x5	Locomobile.....Series 8	Own. 6-4 <sup>1</sup> <sub>2</sub> x5 <sup>1</sup> <sub>2</sub>	48.00 Ball&B.	West... Deleo	m-d Own...	Own... Warner...	F Own... 3.85			
3385	(3185)	(3185)	4685 <sup>†</sup>	4685 <sup>†</sup>	4385	4385	136	32x4 <sup>1</sup> <sub>2</sub>	Marmon.....34	Own. 6-3 <sup>1</sup> <sub>2</sub> x5 <sup>1</sup> <sub>2</sub>	33.75 Strom...	Deleo... Deleo	m-d Own...	Own... Warner...	3 <sup>1</sup> <sub>2</sub> F Own... 4.10			
885	885	.....	975b	985	1235	p1625d	109	31x4	Maxwell.....	Own. 4-3 <sup>1</sup> <sub>2</sub> x4 <sup>1</sup> <sub>2</sub>	21.03 Stewart	Remy... Remy	e Own...	Own... Warner...	f Own... 4.60			
5400	4550g	5700	5600c	6720	6690c	6810	140	33x5	McFarlan.....1923	Own. 6-4 <sup>1</sup> <sub>2</sub> x6	48.00 Rayfield	West... West	n-d M&E...	B-L...	m Peters...	F Tim... 3.75		
3950b	3950e	3950e	4850	6250	5000	132	32x4 <sup>1</sup> <sub>2</sub>	Mercer.....Series 5	Own. 4-3 <sup>1</sup> <sub>2</sub> x6 <sup>1</sup> <sub>2</sub>	22.50 Bull&B.	West... West	Eisem...	m-d Own...	Own... Warner...	F Own... 3.87			
3750e	3750e	3750e	4700	.....	5000	132	32x4 <sup>1</sup> <sub>2</sub>	Mercer.....6	Own. 6-3 <sup>1</sup> <sub>2</sub> x5	33.75 Bull&B.	West... West	Eisem...	m-d Own...	Own... Warner...	3 <sup>1</sup> <sub>2</sub> F Own... 3.77			
1695	1695	.....	.....	.....	119	32x4	.....	Merit.....	Cont. 6-3 <sup>1</sup> <sub>2</sub> x5	27.34 Strom...	Deleo... Deleo	s-p B&B...	Muncie...	f Sneed...	F Col... 4.60			
1590	1590	1850c	2050c	2275	.....	120	32x4	Mitchell.....F-50	Own. 6-3 <sup>1</sup> <sub>2</sub> x5	29.40 Strom...	Remy... Remy	s-p B&B...	Own... Warner...	F Own... 4.42				
1295	1295	.....	1495d	1585c	1695	.....	115	31x4	Mitchell.....F-50	Own. 6-3 <sup>1</sup> <sub>2</sub> x5	29.40 Strom...	Deleo... Deleo	s-p B&B...	Own... Warner...	F Own... 4.42			
.....	.....	1785	(1995c)	2535	(2485	(2635 <sup>†</sup>	128	32x4 <sup>1</sup> <sub>2</sub>	Moon.....6-58	Cont. 6-3 <sup>1</sup> <sub>2</sub> x4 <sup>1</sup> <sub>2</sub>	27.34 Strom...	Deleo... Deleo	s-p B&B...	B-L...	m Spicer...	3 <sup>1</sup> <sub>2</sub> F Tim... 5.00		
1240	1240	1645c	2090	2090	1890	2190	121	33x4	Nash.....691-3-6-7	Own. 6-3 <sup>1</sup> <sub>2</sub> x5	25.35 Marvel	Deleo... Deleo	s-p B&B...	Own... Warner...	1 <sup>1</sup> <sub>2</sub> F Own... 4.50			
915	935	.....	1195d	1445	1275	.....	127	31x4 <sup>1</sup> <sub>2</sub>	Nash.....692-4-5	Own. 6-3 <sup>1</sup> <sub>2</sub> x5	25.35 Marvel	Deleo... Deleo	s-p B&B...	Own... Warner...	1 <sup>1</sup> <sub>2</sub> F Own... 4.50			
915	975	.....	1075c	1475	1595	.....	115	32x4	Nash.....41-8	Own. 4-3 <sup>1</sup> <sub>2</sub> x5	18.23 Marvel	Deleo... Deleo	s-p B&B...	Own... Warner...	3 <sup>1</sup> <sub>2</sub> F Own... 4.88			
2475	2175c	2175	2185d	3250	3285	130	32x4 <sup>1</sup> <sub>2</sub>	National.....BB	Own. 6-3 <sup>1</sup> <sub>2</sub> x5 <sup>1</sup> <sub>2</sub>	29.40 Rayfield	West... Deleo	s-p B&B...	B-L...	m Universal...	F Col... 4.08			
2500	2500	2600c	3500	.....	128	33x5	.....	Nona.....4C	Cont. 6-3 <sup>1</sup> <sub>2</sub> x4 <sup>1</sup> <sub>2</sub>	27.34 Zenith	Deleo... Deleo	s-p B&B...	Detroit...	m Spicer...	1 <sup>1</sup> <sub>2</sub> F Tim... 4.45			
975	995	795g	1165c	1185	1515	.....	115	32x4	Oakland.....6-44	Own. 6-2 <sup>1</sup> <sub>2</sub> x4 <sup>1</sup> <sub>2</sub>	18.90 Marvel	Deleo... Deleo	s-p B&B...	Muncie...	f Mech...	F Own... 4.66		
975	975	.....	1075c	1475	1595	.....	115	32x4	Oldsmobile.....43 A	Own. 4-3 <sup>1</sup> <sub>2</sub> x5 <sup>1</sup> <sub>2</sub>	21.86 Zenith	Deleo... Deleo	s-p B&B...	Muncie...	m Own...	3 <sup>1</sup> <sub>2</sub> F Own... 1.70		
1850	1850	1735	2635	123	33x4 <sup>1</sup> <sub>2</sub>	.....	126	33x4 <sup>1</sup> <sub>2</sub>	Oldsmobile.....46	Own. 8-2 <sup>1</sup> <sub>2</sub> x4 <sup>1</sup> <sub>2</sub>	26.45 Ball&B.	Deleo... Deleo	e Own...	Muncie...	m Spicer...	F Own... 1.93		
1625p	1375	1675c	1875	2025	115	32x4	.....	Oldsmobile.....47	Own. 8-2 <sup>1</sup> <sub>2</sub> x4 <sup>1</sup> <sub>2</sub>	26.45 Johnson	Deleo... Deleo	s-p B&B...	Muncie...	m Own...	3 <sup>1</sup> <sub>2</sub> F Own... 5.10			
525	525	425g	795	860	.....	100	30x3 <sup>1</sup> <sub>2</sub>	Overland.....91	Own. 4-3 <sup>1</sup> <sub>2</sub> x4	18.23 Till	A-L... A-L...	s-p B&B...	Own... Warner...	1 <sup>1</sup> <sub>2</sub> F Own... 4.50				
750	750	.....	.....	.....	106	30x3 <sup>1</sup> <sub>2</sub>	Overland.....92	Own. 4-3 <sup>1</sup> <sub>2</sub> x4	19.00 Till	A-L... A-L...	s-p B&B...	Own... Warner...	1 <sup>1</sup> <sub>2</sub> F Own... 4.50					
2485	2185	2250g	2650c	3175c	3275	3350d	126	33x4 <sup>1</sup> <sub>2</sub>	Packard.....126	Own. 6-3 <sup>1</sup> <sub>2</sub> x5	27.34 Strom...	Deleo... Deleo	A-K...	m-d Own...	Own... Warner...	1 <sup>1</sup> <sub>2</sub> F Own... 1.66		
2350	2350	2685	.....	.....	3525	133	33x4 <sup>1</sup> <sub>2</sub>	Packard.....133	Own. 6-3 <sup>1</sup> <sub>2</sub> x5	27.31 Strom...	Deleo... Deleo	A-K...	m-d Own...	Own... Warner...	1 <sup>1</sup> <sub>2</sub> F Own... 1.66			
3850	3850	3650	4550c	4725	d1700 <sup>†</sup>	136	33x4 <sup>1</sup> <sub>2</sub>	Packard.....Eight	Own. 8-3 <sup>1</sup> <sub>2</sub> x5	36.45 Strom...	Deleo... Deleo	m-d Own...	Own... Warner...	1 <sup>1</sup> <sub>2</sub> F Own... 4.50				
3850	3850	3850	4900f	4953	143	33x4 <sup>1</sup> <sub>2</sub>	Packard.....Eight	Own. 8-3 <sup>1</sup> <sub>2</sub> x5	36.45 Strom...	Deleo... Deleo	m-d Own...	Own... Warner...	1 <sup>1</sup> <sub>2</sub> F Own... 4.50					
3850	3850	3850	5240	5400	136	35x5	.....	Packard.....335	12-3x 5	43.20 Strom...	Bijur... Bijur	Deleo... Deleo	m-d Own...	Own... Warner...	3 <sup>1</sup> <sub>2</sub> F Own... 1.36			
2695	2450	2450	.....	3235	(3235	131	33x4 <sup>1</sup> <sub>2</sub>	Paige.....6-70	Cont. 6-3 <sup>1</sup> <sub>2</sub> x5	33.75 Rayfield	Remy... Remy	A-K...	m-d Long...	Warner...	m Mech...	1 <sup>1</sup> <sub>2</sub> F Tim... 4.60		
1550	1390	1425	1465d	2395d	2395	120	32x4 <sup>1</sup> <sub>2</sub>	Paterson.....23-6-52	Cont. 6-3 <sup>1</sup> <sub>2</sub> x4 <sup>1</sup> <sub>2</sub>	27.34 Strom...	Deleo... Deleo	s-p B&B...	Durston...	m Hartford...	3 <sup>1</sup> <sub>2</sub> F Salis... 4.50			
3300	2990	2990	.....	3300	3400	4090	128	33x5	Peerless.....23	Own. 8-3 <sup>1</sup> <sub>2</sub> x5	33.80 Ball&B.	Deleo... Deleo	m-d Own...	Own... Warner...	3 <sup>1</sup> <sub>2</sub> F Tim... 1.90			
5250	5250	5250	6800	6900	6800	138	33x5	Pierce-Arrow.....	Own. 6-4 x 5 <sup>1</sup> <sub>2</sub>	38.40 Strom...	Deleo... Deleo	m-d Own...	Own... Warner...	3 <sup>1</sup> <sub>2</sub> F Own... 4.20				
1695	1745	1745	2445	2495	.....	126	32x4 <sup>1</sup> <sub>2</sub>	Pilot.....6-50	Own. 6-3 <sup>1</sup> <sub>2</sub> x5	25.35 Strom...	Bijur... Bijur	A-K...	m Own...	Own... Warner...	1 <sup>1</sup> <sub>2</sub> F Own... 1.66			
3150	3100	3250	3300c	4300f	5000	5100	126	32x4 <sup>1</sup> <sub>2</sub>	Premier.....6-D	Own. 6-3 <sup>1</sup> <sub>2</sub> x5 <sup>1</sup> <sub>2</sub>	27.34 Strom...	Deleo... Deleo	s-p B&B...	Own... Warner...	1 <sup>1</sup> <sub>2</sub> F Own... 4.58			
1095	1095	1750	1825	1825	117	32x4	.....	Premocar.....6-40-A	Own. 6-3 <sup>1</sup> <sub>2</sub> x4 <sup>1</sup> <sub>2</sub>	23.44 Strom...	Wagner... Wagner	s-p B&B...	Mech...	m Spicer...	3 <sup>1</sup> <sub>2</sub> F Own... 5.00			
1665	1665	2385	2385	2385	116	32x4	.....	R & V Knight.....R	Own. 4-3 <sup>1</sup> <sub>2</sub> x5	22.50 Strom...	Strom... Strom	s-p B&B...	B-L...	m Spicer...	F Salis... 4.75			
2850	2850	2850c	3500	3700	124	32x4 <sup>1</sup> <sub>2</sub>	.....	R & V Knight.....H	Own. 6-3 <sup>1</sup> <sub>2</sub> x4 <sup>1</sup> <sub>2</sub>	29.40 Strom...	Strom... Strom	s-p B&B...	B-L...	m Spicer...	1 <sup>1</sup> <sub>2</sub> F Tim... 4.40			
1615	1615	1485	1745	1855c	1855c	124	32x4	Reo.....T6	Own. 6-3 <sup>1</sup> <sub>2</sub> x5	24.34 Rayfield	N.E... N.E...	m-d Own...	Own... Warner...	1 <sup>1</sup> <sub>2</sub> F Own... 4.70				
1485	1485	1485	1855c	1855d	117	32x4	.....	Rickenbacker.....B	Own. 6-3 <sup>1</sup> <sub>2</sub> x4 <sup>1</sup> <sub>2</sub>	23.44 Strom...	Bosch... Bosch	s-p B&B...	Warner...	m Mechanics...	3 <sup>1</sup> <sub>2</sub> F Col... 4.63			
2685	2685	2750c	3285	3585	128	32x4 <sup>1</sup> <sub>2</sub>	.....	Roamer.....6-54-E	Cont. 6-3 <sup>1</sup> <sub>2</sub> x5 <sup>1</sup> <sub>2</sub>	29.40 Strom...	West... West	s-p B&B...	G-L...	f Snead...	1 <sup>1</sup> <sub>2</sub> F Tim... 4.60			
3685	3495	3800	3650c	4650p	4000 <sup>†</sup>	138	32x4 <sup>1</sup> <sub>2</sub>	Roamer.....6-54-E	Cont. 6-4 <sup>1</sup> <sub>2</sub> x5 <sup>1</sup> <sub>2</sub>	28.90 Strom...	West... West	s-p B&B...	G-L...	f Snead...	1 <sup>1</sup> <sub>2</sub> F Tim... 4.03			
10900	10900	10950	.....	12800	12850	143 <sup>1</sup> <sub>2</sub>	33x5	Rolls-Royce.....40-50	Own. 6-4 <sup>1</sup> <sub>2</sub> x4 <sup>1</sup> <sub>2</sub>	48.00 Strom...	Bijur... Bijur	s-p B&B...	Own... Warner...	m Universal...	F Own... 3.25			
.....	.....	.....	.....	5100	5200	118	32x4	Rubay.....	Own. 4-2 <sup>1</sup> <sub>2</sub> x5 <sup>1</sup> <sub>2</sub>	38.40 Strom...	Bosch... Bosch	s-p B&B...	Own... Warner...	m Universal...	F Own... 5.10			
1645	1645	.....	2615d	2615	118	33x4	.....	Sayers Six.....DP	Cont. 6-3 <sup>1</sup> <sub>2</sub> x4 <sup>1</sup> <sub>2</sub>	27.34 Strom...	Deleo... Deleo	s-p B&B...	G-J...	m Arvac...	1 <sup>1</sup> <sub>2</sub> F Eaton... 4.75			
875	875	.....	.....	103	30x3 <sup>1</sup> <sub>2</sub>	.....	.....	Seneca.....I-2 & O-2	Own. 6-3 <sup>1</sup> <sub>2</sub> x5	19.60 Strom...	Zenith... Zenith	A-L...	s-p B&B...	m Universal...	F Peru... 4.75			
985	985	.....	2500	2500c	112	31x4	.....	Seneca.....50 & 51c	Own. 6-3 <sup>1</sup> <sub>2</sub> x5	21.03 Strom...	A-L...	s-p B&B...	G-L...	F Peru... 4.50				
.....	.....	2500	2500c	3100	3100	127	31x4 <sup>1</sup> <sub>2&lt;/</sub>											



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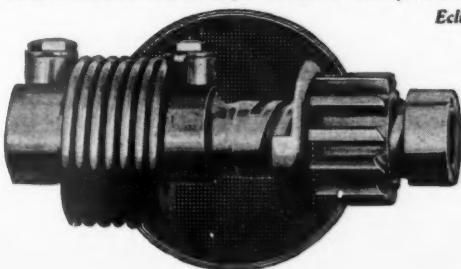
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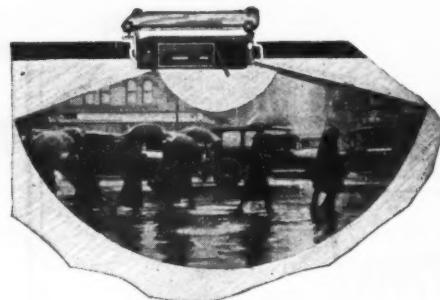
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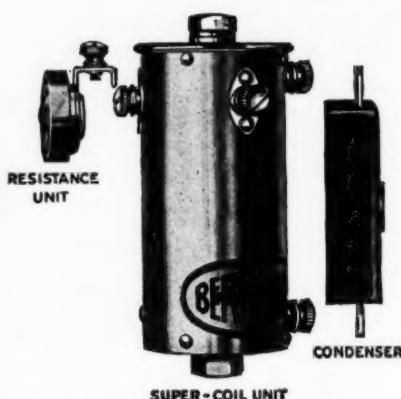
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The Old Reliable J & B Timer. A standard for years. Known to the discriminating Ford-owner and the progressive Dealer as being *long-lived, dependable and efficient*. It is built by Ignition specialists and is designed to synchronize with the motor in the Ford Car, Truck or Tractor. Rugged and fool-proof. Guaranteed to fit, to serve and to satisfy.

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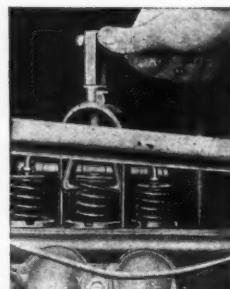
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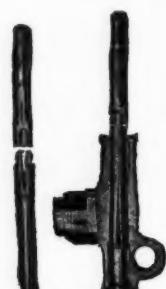
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A time, temper and money saver. Indispensable to the shop repairing Buick Cars. It lifts the Rocker arm clear of the ball end of the push rod. This allows the push rod to be sprung out of place, after which the Rocker Arm can be revolved on its axis away from the valve stem, giving free access to the valve cage spring and stem. Simple, durable and practical. Made of Alloy Steel, Drop-Forged. Rust-proofed. Retail Price, \$2.00.



### The Berkshire—J & B Buick Valve Cage Remover

Gain access to the inside of the Buick Motor. The Valve Cage Remover comes into action after the Rocker Arm is free from the Valve Stem. The Valve Cage Remover grasps the two top coils of the Valve Cage Assembly Spring and gradually draws the valve cage clear without bending the Valve Stem. Both the Valve Cage Remover and the Rocker Arm Lifter can be used without disturbing the water pipe connections or any adjacent parts. Made of Alloy Steel, Drop-forged. Rust-proofed. Retail Price.....\$5.00



### The Berkshire—J & B Bushing Remover

Every Repairman has experienced difficulty in removing stubborn bushings, particularly those in the Spindle Body of the Ford. This Bushing Remover is the solution. Quickly removes any bushing of half-inch diameter. A necessity in every Garage and Repair Shop. Thousands in daily use. Drop Forged from Alloy Steel. Rust-proofed. Retail Price.....\$1.00



### The Berkshire—J & B Buick Wheel Puller

Meets the difficult problem of removing wheels from full-floating rear axles. Designed by an expert on wheels and axles. Easily operated and pays its first cost in a day's time. Remove the flange nuts, driving flange and axle—place the wheel puller over two directly opposite bolts, use two of the flange nuts to hold it. Turn the central screw with a wrench until the plate is in contact with the axle tube—the wheel comes off squarely. Made of alloy steel, drop forged. Screw is of selected machine steel. The whole is rust-proofed. Retail Price.....\$3.50

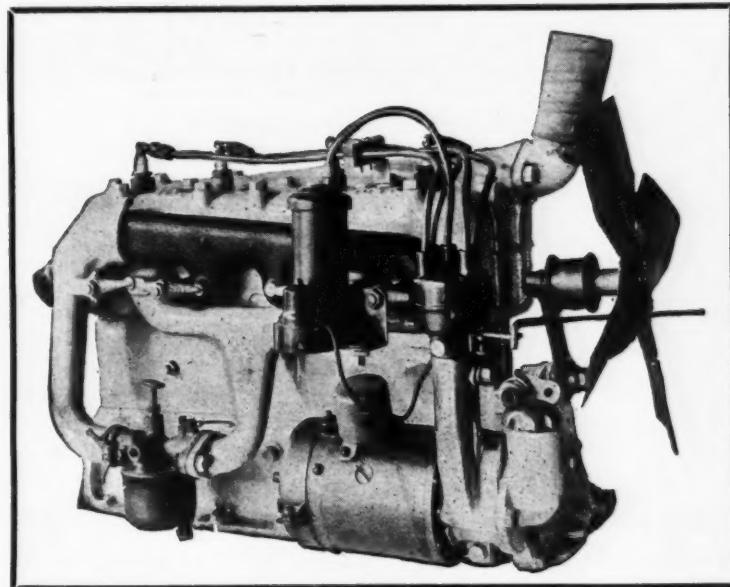
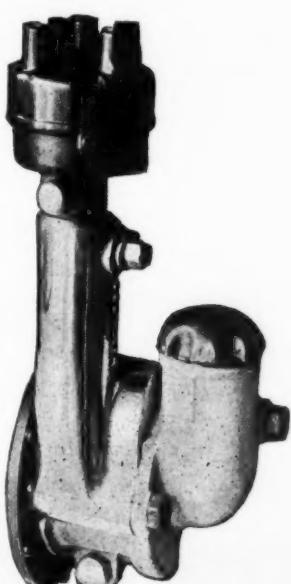
Manufactured by

## BERKSHIRE PRODUCTS CORPORATION

Successors to — J & B Manufacturing Co. Berkshire Magneto Co.  
"Automotive Equipment Manufacturers for Almost a Quarter Century."

PITTSFIELD, MASSACHUSETTS U. S. A.

## Show Ford Owners How to Get Utmost Power From Their Motor



YOU can build up a profitable business showing Ford owners how they can get more power out of their motors at all times and eliminate all ignition trouble at the same time.

The H & H Ignition System gives the Ford motor the two essentials to a perfect combustion, a hot generous spark and a spark timed with absolute accuracy.

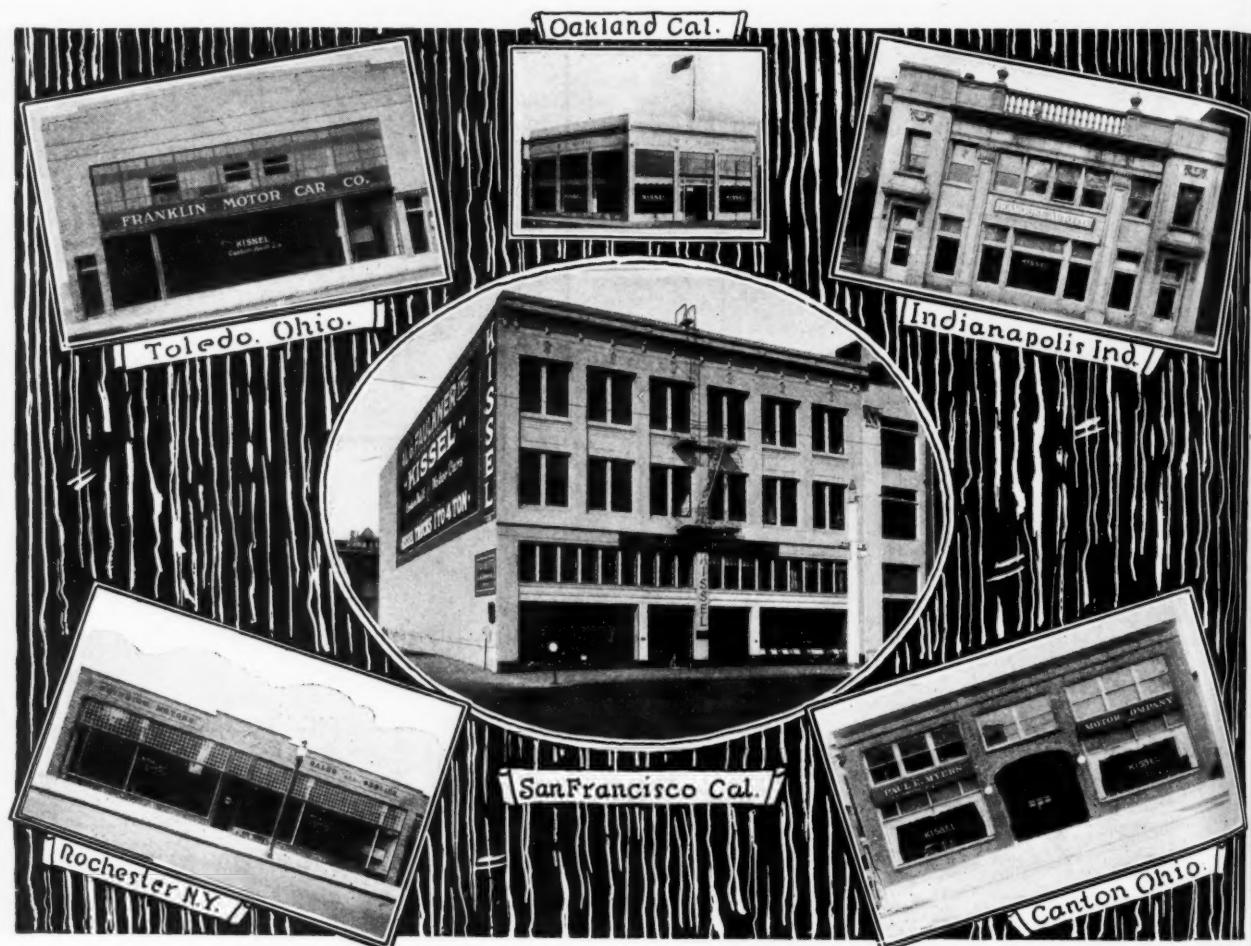
Any expert motor engineer will tell you that the hotter and bigger the spark the more perfect the combustion, and this is what you get with this ignition system. It brings out

all the latent and undeveloped power.

The H & H Ignition System prevents carbon formation because it eliminates tardy intermittent firing and enables the driver to make a quick get-a-way. The motor runs smoother and it can be throttled down to 1½ miles per hour without a buck.

There are many advantages to the H & H Ignition System which shows you how to make profits every month in the year. The list price is \$22.50 for the complete unit. Manufactured by The H & H Generator-Ignition Co., 185 Middle Street, Bridgeport, Conn.

## *The H & H Generator-Ignition Unit for Fords*



## A Manufacturer Is Known by the Caliber Of His Dealers

On this and the opposite page are photographs of the showrooms and service buildings of twelve new Kissel distributors and dealers—part of the seventy odd new sales organizations that have taken on the Kissel Franchise during the last ninety days.

The actual sales records of these dealers reveal the enthusiastic reception of Model "Fifty-five" and indicate the opportunity that exists for profits in handling this quality line.

A typical example is that of the St. Louis Motor Car Company selling 33 Kissels the first 30 days. Also the Kanouse Auto Company, Indianapolis, sold 10 the week of their Kissel opening, while the Franklin Motor Company, Toledo, ordered 10 during the first 10 days.

Likewise, no better indication of the success of the Kissel Motor Car Company and the Custom-built Six can be given than by reading the list of Kissel sales connections that have been mutually profitable over a long period of years.

*The Custom*  *Built Car*

# KISSEL



For instance—Harry Branstetter, who has handled Kissels exclusively in the Chicago and Illinois territory for fifteen years, sold 52 Kissels during May, while the Kissel dealer at Wausau, Wisconsin, a city of about 20,000 population, sold 10 Kissels during May.

These and other distributors and dealers, like them that comprise the vast countrywide Kissel distributing organization, made possible a 300 per cent increase in sales during the first quarter of 1923. The same dealers are making possible practically doubling the Kissel output for the second quarter.

The powerful "Fifty-five" motor recently shattered traditions in California by being the first car to make the Yosemite Valley trip over Wawona Road from Merced OFFICIALLY SEALED IN HIGH GEAR. This and other instances indicate the unusual power, flexibility and dependability of Model "Fifty-five."

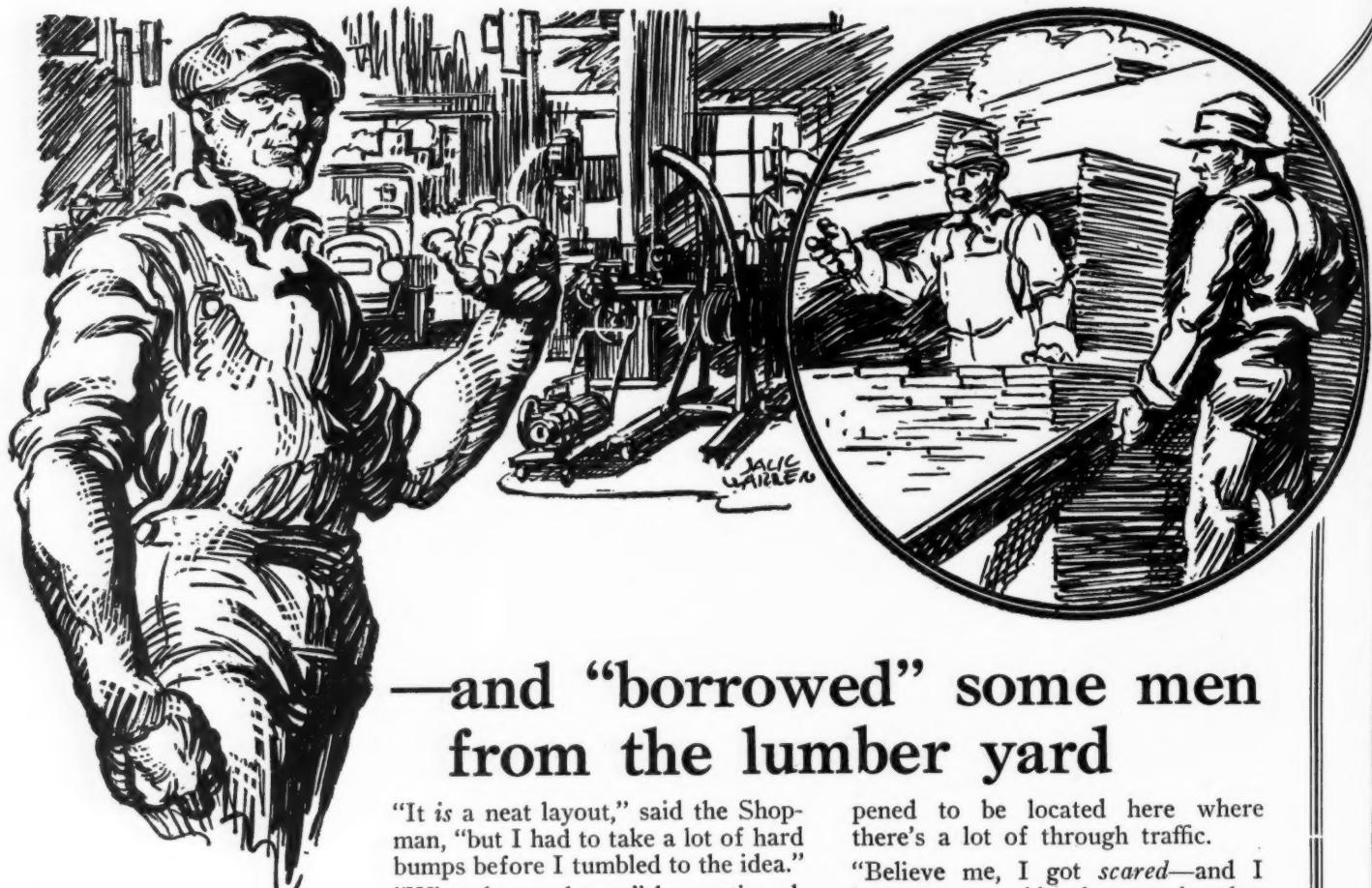
By producing the Custom-built Six in quantity, Kissel has created an entirely new opportunity for dealers to sell a quality automobile on a volume basis.

Perhaps the Kissel line is available in your territory. The many instances of splendid dealer success we can show you, coupled with the unusual profit possibilities of the Kissel contract, will prove as interesting to you as it did to the officials of the companies shown above.

**KISSEL MOTOR CAR CO., Hartford, Wis.**

*The Custom*  *Built Car*

# KISSEL



## —and “borrowed” some men from the lumber yard

“It is a neat layout,” said the Shopman, “but I had to take a lot of hard bumps before I tumbled to the idea.”

“Why, do you know,” he continued, “when I had only myself and one helper in the shop I had to ‘borrow’ a couple of men from the lumber yard down the road whenever I wanted to pull an engine out of a car and carry it over to the wooden horses! You can imagine what it cost me to do a job in those days, and what I had to charge for it. And some of those jobs were back breakers—I used to think I’d rather lose a good job than have to refit a set of pistons: lying there under that old pair of horses, working the pistons up and down, up and down, like a monkey on a stick. Just figure the time I had to charge for; and what a sloppy job it was, in the end.”

“Did you lose any customers that way?” he was asked.

“Well,” he answered with a grin, “I guess I discouraged a few of ‘em. I was a pretty cocky sort of cuss, anyway; and I used to think what a wise bird I was not to fall for this shop equipment stuff. I figured that if my hands were good enough for my customers, they were good enough for me—until a lot of my steady trade pulled away and I had to depend on transient business: accidents close by and that sort of lucky pickin’s. And I wouldn’t have had much of that, if I hadn’t hap-

pened to be located here where there’s a lot of through traffic.

“Believe me, I got scared—and I began to see a bit of reason in what those equipment chaps were saying. I took a shot at a few pieces just to see what would happen. I put in an engine stand, a press and a cylinder burnishing machine. It was like finding a gold mine: I began to make money again—because I could do better work, get the job delivered ‘way sooner, save my time and my helper’s time: I felt at last that I owned a business instead of a sweat shop. And pretty soon I added some more. One thing suggested another. My engine stand made me think of a crane to carry the motor. My press suggested a gear puller and my burnishing machine showed me the advantage of a piston aligner. It wasn’t all done overnight of course. But it’s paid big, and now look at it—I’ve got an electric drill, an outfit of electrical testing devices, an acetylene welding outfit, a whole mess of speed wrenches and small tools, and I’m going to keep on adding to ‘em just as long as it keeps on paying the way it is now. I’ve got a wrecking outfit ordered, and that ought to be a big money maker out here where there’s so much touring.

“Yep, I’ve learned what those chaps meant when they said THE BEST-EQUIPPED SHOP GETS THE BUSINESS.”

SEA

# Names Every Shop Man Should Know

*A*NY of the manufacturers listed below will help you in the selection of equipment best suited to conditions in your shop without obligating you in any way.

**Continental Auto Parts Company**  
Columbus, Ind.

Motor Overhauling, Radiator and Axle Stands  
Piston Vises, Gear Pullers  
Creepers  
Wrecking Trucks  
Straightening Presses  
Piston Aligning Devices  
Burning-in Machines

**Wright Mfg. Co.**  
Lisbon, Ohio

Wright High-Speed Chain Hoists  
Standard Screw Chain Hoists  
Differential Chain Hoists  
Steel Trolleys for Overhead Track Systems  
Hand Traveling Cranes

**The Manley Mfg. Co.**  
York, Pa.

Cranes—Wrecking and Floor Presses—Garage and Arbor  
Auto Hoists, Garage Lights  
Garage and Service Jacks  
Towing Trucks  
Engine and Axle Stands  
Portable Benches  
Portable Tool Trays  
Air and Water Stations  
Truck Wheel Handler  
Chassis Underworker

**Bonney Forge & Tool Works**  
Allentown, Pa.

Original Chrome-Vanadium Drop Forged Wrenches  
Original Chrome-Vanadium Valve Tappet Wrenches  
Carbon Steel Drop Forged Wrenches of all kinds  
Stilson Pipe Wrenches  
Adjustable Wrenches  
Combination Wrenches  
Garage and Small Vises  
Battery and Grease Cup Pliers  
Body Iron Assortments  
Special Automobile Tools  
Drop Forgings

**The Burton-Rogers Company**  
755 Boylston Street  
Boston, Mass.

Hoyt Electrical Instruments  
Ammeters  
Volt Meters  
Rotary Meters  
Growler Sets  
Magneto Testers  
Cadmium Meters  
Cell Meters  
Mohawk Rectifiers

**Weaver Mfg. Co.**  
Springfield, Ill.

Auto Hoists, Axle Stands  
Arbor Presses, Jacks  
Ambulances  
Tire Changers  
Tire Spreaders  
Wire Wheel Repair Stands  
Bucket Pumps  
Gasoline Cans

**Mid-West Manufacturing Co.**  
Minneapolis, Minn.

Red Devil Dolly Jacks  
Tire Changing Jacks  
Adjustable Garage Horses  
Garage Cranes and Ambulances  
Burnishing Machines and Burnishing Compounds

**Frank Mossberg Company**  
Lamb St.  
Attleboro, Mass.

**Wrenchsmiths for 20 Years**  
Solid Socket Wrenches  
"Tee" Handles  
Speeders, "Swivel Joint"  
"Tee" Handles and Speeders  
Special Wrenches and Tools for Fords  
Miscellaneous Automobile Tools  
Socket Wrench Sets and Accessories  
Engineers' Wrenches  
Adjustable Wrenches  
Metal Stamping

**The Black & Decker Mfg. Co.**  
Baltimore, Md.

Portable Electric Drills  
Electric Air Compressors  
Electric Portable and Bench Grinders  
Electric Valve Grinders  
Bench Drill Stands

**T. R. Almond Mfg. Co.**  
Ashburnham, Mass.

Drill Chucks  
Lathe Chucks  
Micrometers, Outside  
Micrometers, Inside, for Cylinder Measurements

**Brunner Mfg. Co.**  
Utica, N. Y.

Air Compressors  
Air Tanks  
Air Hose  
Air Valves  
Automatic Pressure Controllers

**Stevens & Company**  
375 Broadway  
New York

**Stevens "SPEED-UP" Tools**  
Piston Aligner  
Microgauge  
Piston Vise  
Valve Reseaters and Refacers  
90 Special Tools for Ford and Fordson  
Sectional Cabinets

**Kellogg Manufacturing Company**  
Rochester, N. Y.

Kellogg Electric Motor Driven Garage Compressors  
Kellogg Air Towers  
Kellogg Valves  
Kellogg Gauges

**Weidenhoff Products**  
4352-58 W. Roosevelt Rd.  
Chicago, Ill.

Electrical Testing Devices  
Test Benches  
Battery Dischargers  
Growlers  
Magnetizers  
Variable Speed Motors  
Generator Holding Vises and Driving Chucks  
Mica Undercutters

**The Jacobs Manufacturing Company**  
Hartford, Conn.

Drill Chucks

**Oxweld Acetylene Co.**  
Newark, Chicago,  
San Francisco

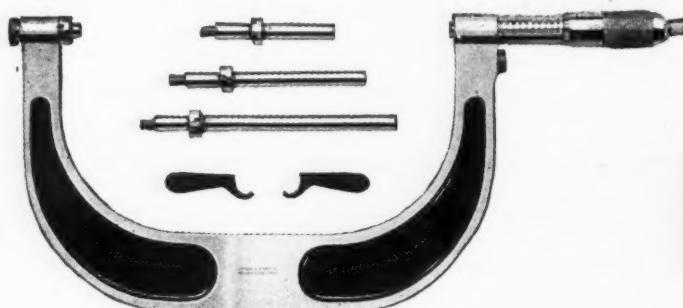
Oxy-Acetylene Apparatus and Supplies  
Ever-Ready Welding, Cutting and Lead-Burning Outfits

This advertisement is published and paid for by the concerns listed above who are pioneers in the development of time and labor-saving equipment for automotive service work.

These concerns are co-operating with all automotive service men, and you are cordially invited to write to any of them for information and advice regarding the class of equipment shown below their names.

**SERVICE EQUIPMENT ASSOCIATES**

**"The Best-Equipped Shop Gets the Business"**



Outside Micrometer

No. 622

Price \$25.00



Mr. Punch says:  
 "A micrometer is as necessary to a good mechanic as a hammer is to a carpenter."



Inside Micrometer

No. 618

Price \$12.00

## Where accuracy is important

WHETHER or not the jobs that come out of your shop are done well depends largely upon correct measurements.

For all inside measurements from 2 to 6 inches you can measure to within 1-1000 of an inch with this Inside Micrometer. Four measuring-rods are furnished. Measurements are read directly from the barrel. Each micrometer is furnished with a long handle for use in places that cannot be reached by hand.

For all outside measurements from 2 to 6 inches you can measure to within 1-1000 of an inch with the Outside Micrometer shown above. Provided with three extra anvils. Micrometer has a one-piece hardened tool steel spindle and lead screw running in a hardened bushing. The eccentric locking device is easy to operate and positive in action. Accuracy guaranteed.

Write now for Catalog No. 15, which illustrates and describes entire line of 1500 Good Tools.

GOODELL-PRATT COMPANY

*Toolsmiths*

Greenfield, Mass., U. S. A.

**GOODELL-PRATT**  
**1500 GOOD TOOLS**

PROVEN QUALITY

A BULWARK of STRENGTH

SATISFIED  
CUSTOMERS

RESTRICTED  
COMPETITION

SOLD DIRECT  
FROM THE  
FACTORY

EXTRA  
PROFITS

SATISFIED  
CUSTOMERS

RESTRICTED  
COMPETITION

SOLD DIRECT  
FROM THE  
FACTORY

EXTRA  
PROFITS

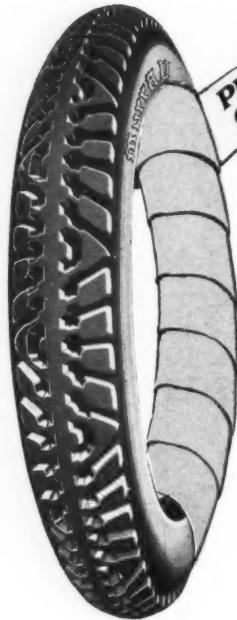
Murray

"Not A Worry"

TIRES

FULL OVERSIZE

## PROVEN QUALITY



PROVEN  
QUALITY  
SATISFIED  
CUSTOMERS  
RESTRICTED  
COMPETITION  
SOLD DIRECT from  
the FACTORY  
EXTRA  
PROFITS

# Murray

**"Not A Worry"**

# TIRES

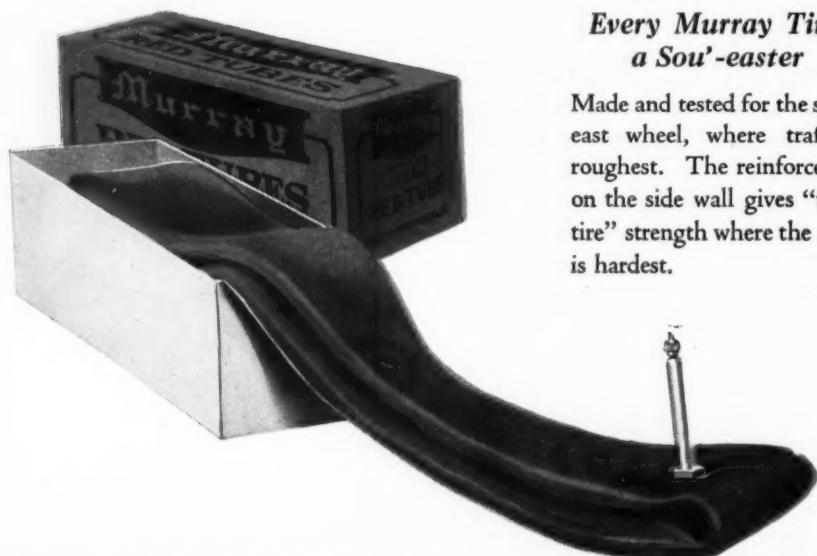
**FULL OVERSIZE**  
CORD FABRIC

STEP by step a new tire comes into being. Years of study and experiments — the latest tire building machinery — new merchandising and distribution plans — and then, the tire, itself.

But even then its true value to the dealer is not manifest. Not until, by actual performance, it has proven its quality. Then, and only then, does it become an asset upon which to build future prosperity.

### MURRAY

Tires have proven their right to be known as quality products. Our factories are running 24 hours a day to meet the 1923 demand. A remarkable tribute to our policy of eliminating all unnecessary expense to give extra quality to the tire and extra profits to the dealer.



#### Every Murray Tire a Sou'-easter

Made and tested for the south-east wheel, where traffic is roughest. The reinforcement on the side wall gives "truck-tire" strength where the strain is hardest.

#### Write for our Exclusive Dealers' Proposition

Be the sole distributor in your community for this quality, profit-bearing tire. We will be glad to discuss our distribution plan with dealers and show you how we can sell such a good tire at such a low price.

**MURRAY RUBBER COMPANY, TRENTON, N.J.**

You can sell this  
plug for - **60¢!**

And make **27¢** on each plug

COMPARE this profit with your profit on *any other* Ford plug.

And this display board helps you make that profit we're talking about.

50 plugs on each board—each board a flash of color that sticks out and "asks 'em to buy."

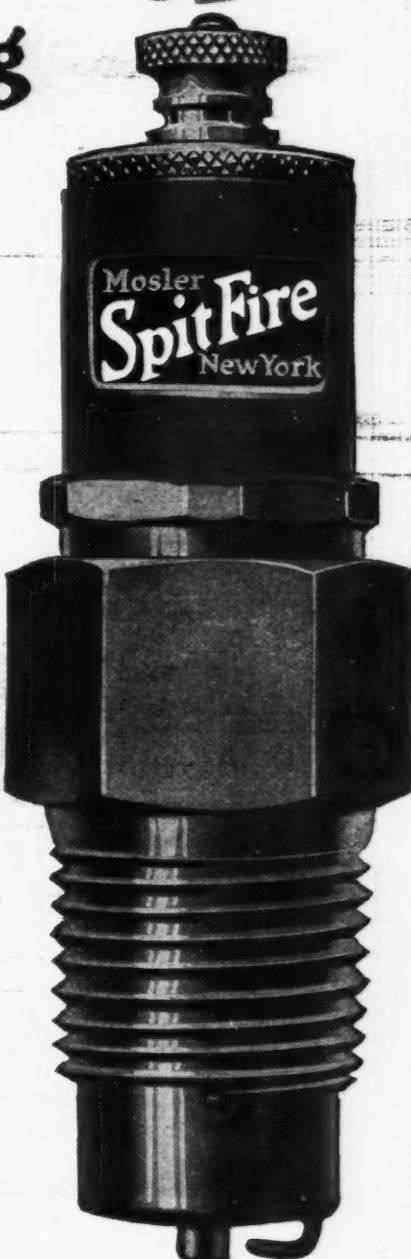
The plugs are on the board where people can see them—not hidden away on the shelf where you have to look for them.

This Spit Fire Display Board is free.

We'll tell you how to get it.

Write.

**RED TOP  
FOR  
FORD**



MOSLER  
METAL PRODUCTS CORP.

MT. VERNON, N. Y.

Export Representative:  
AUTO SUNDRIES COMPANY  
New York City

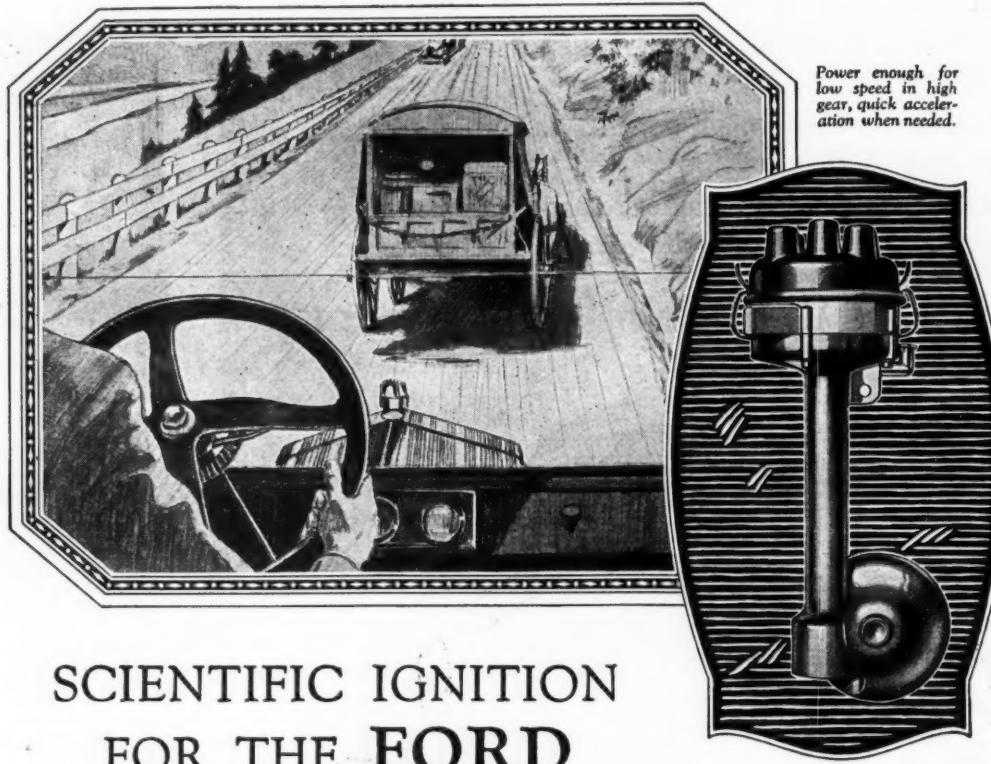
Mosler  
1898

1923 is a Spit Fire Year!

Mosler  
1923

# ATWATER KENT

*Makers of*  
**THE WORLD'S HIGHEST GRADE IGNITION  
STARTING AND LIGHTING**



## SCIENTIFIC IGNITION FOR THE FORD

Type LA

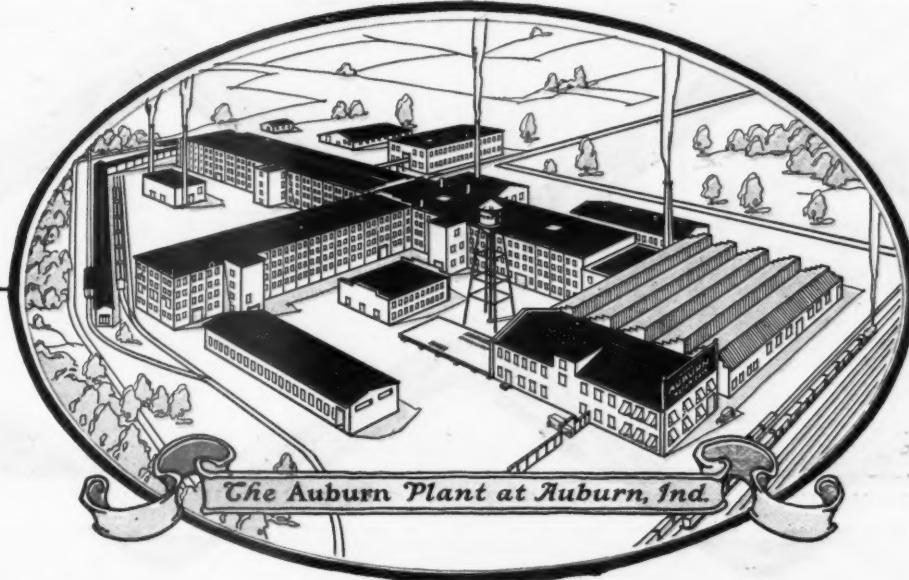
ATWATER KENT Ignition Type LA is scientifically designed to develop the highest efficiency of the Ford motor.

Many thousands of Ford owners have already demonstrated the marked improvement which this system produces in their cars.

This acceptance by owners, and the constantly increasing number of Ford cars, presents a ready and profitable market for dealers in ATWATER KENT Equipment.

Price **\$10.80** Including cables  
and fittings

**ATWATER KENT MANUFACTURING CO.**  
4957 STENTON AVENUE, PHILADELPHIA, PA.



# *This Big Factory houses a live Organization —*

THAT'S what they all say when they come to Auburn, see the new cars, take a look at the big drive-aways that leave nearly every day, and see what is doing in the big assembly rooms.

It's a great year for Auburn, a standard car of long standing in the trade that has grown into popularity many times greater than it has ever known.

Old-time Auburn distributors have doubled and tripled their dealer organizations. One new distributor, The East Liberty Motor Sales Co., Pittsburgh, Pa., put on thirty dealers in the first six

weeks and took every car we could give them.

The Auburn factory itself is an eye-opener for dealers who don't know Auburn. They are surprised at the fine equipment, its completeness and efficiency. It has everything any factory could have to turn out good cars and sell them at prices that make them real values.

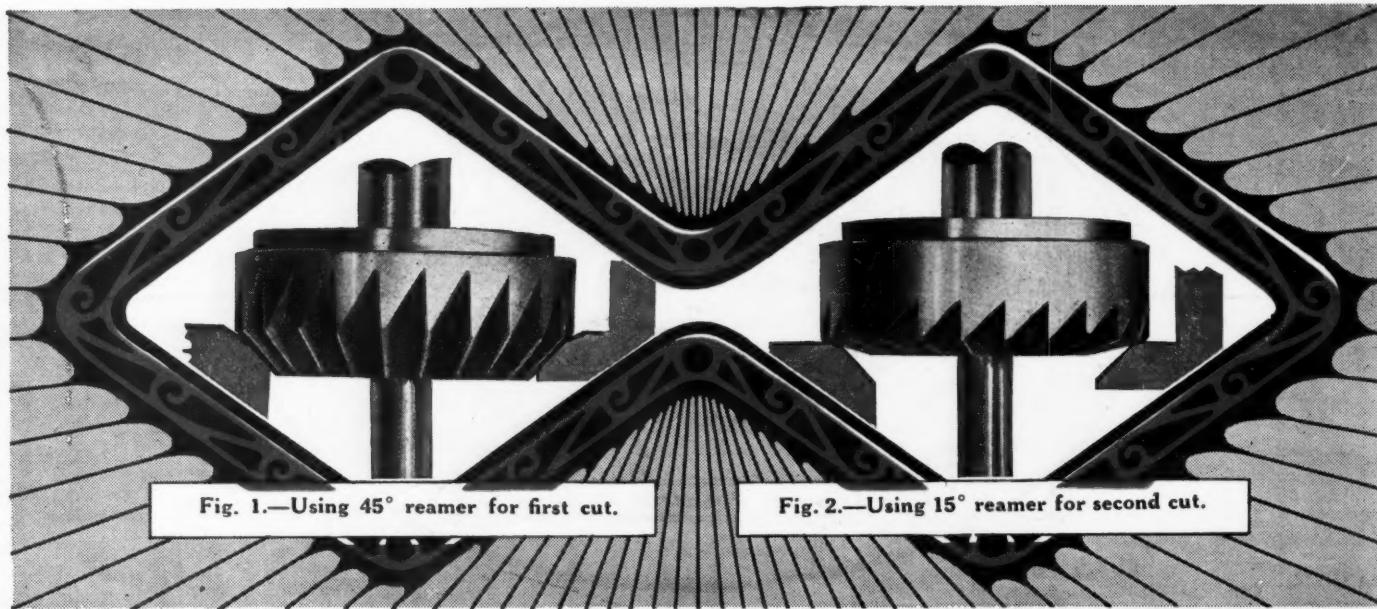
This year there is a big husky six selling for \$1165 and a 70-mile-an-hour car with an astounding new motor for \$1725. They both have all the well-known Auburn beauty and finish. The body work is of the finest quality.

*They're going big! Write for the facts about your territory.*

AUBURN AUTOMOBILE COMPANY, Auburn, Indiana

# AUBURN





## How to Reface Valve Seats for More Accurate Fitting

**I**N reaming valve seats mechanics often find difficulty in centering the reamer over an uneven guide hole.

When this happens it is necessary to recut the valve seat to get it into alignment with the hole. Then, after reaming a second time, it is usually found that the seat has been reamed so far that it is too wide for a good tight seating of the valve and often with a bearing surface wider on one side than on the other.

This difficulty is avoided, and a quicker and more accurate job obtained, by proceeding as follows:

Make the first cut at 45° in the ordinary way with the Sioux Valve Seat Reamer. (See Fig. 1.) Then take a 15° Sioux Reamer and bevel off the top of the valve seat as shown in Fig. 2. Work down until the **lower** line of the 15° cut measures a little below the outside diameter of the valve face.

Now take your 75° Sioux Reamer and reface the lowest

part of the valve seat as shown in Fig. 3. Cut down until the **upper** line is a little above the inside diameter of the valve face.

Your valve seat will now appear as shown in Fig. 4, and in absolute alignment with the guide hole. It is now perfectly centered and the proper width for most lasting results. The 15° and 75° reamers can be used with the same results on the 30° or 60° valve seats.

All possibility of chattering of valve seat is prevented simply by inserting a piece of 50 lb. wrapping paper, large enough to cover valve seat, on the stem against cutting points of reamer. Write for free sample.

When ordering 15° and 75° valve seat reamers the 15° should be the same size as the valve head, and 75° in most cases should be approximately 1/8 inch smaller.

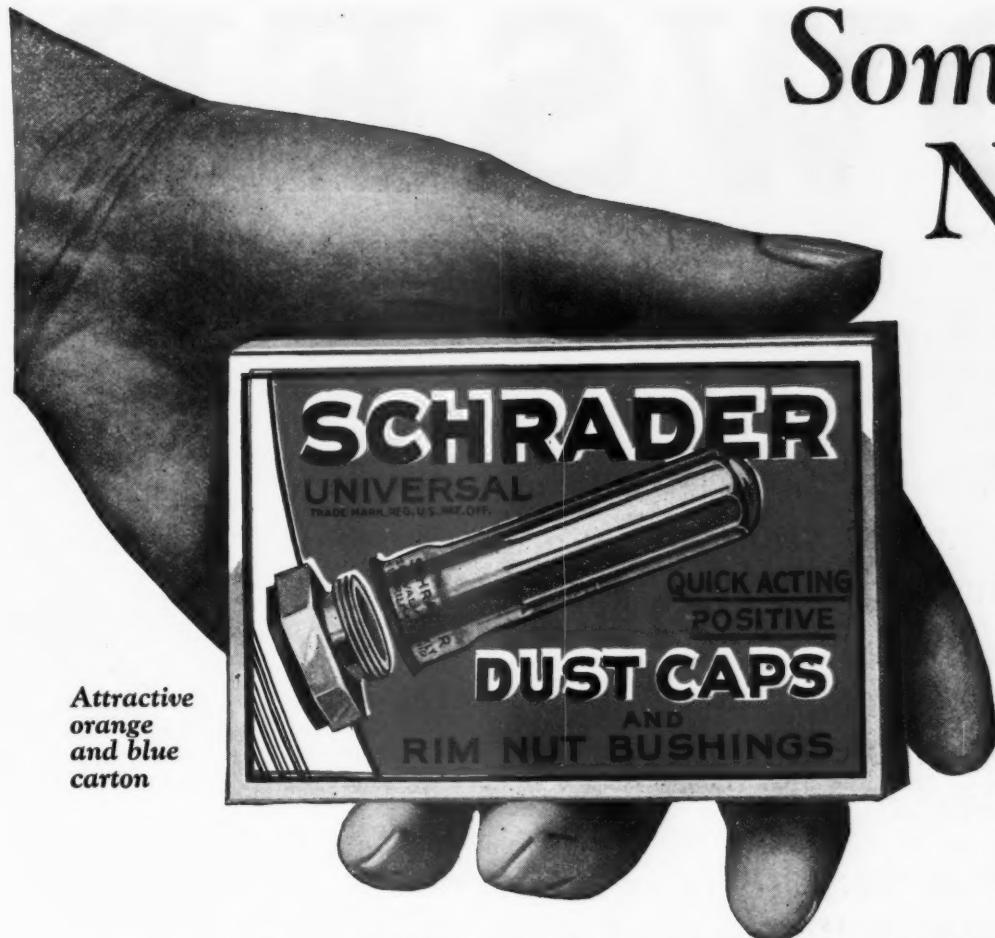
Any size 15° and 75° Sioux Reamer may be obtained at the same prices as corresponding sizes of 45° reamers. Write for catalog and valve seat reamer specifications.

ALBERTSON & CO., SIOUX CITY, IOWA

## Your Jobber Sells Them



# Something New!



**A quick-acting, positive dust cap**  
**Can be attached or detached with a few turns of the hand**

THIS new type Schrader Dust Cap slips over the valve stem, and screws onto the rim nut bushing. The motorist can put it on or take it off easily and rapidly.

The quick-acting feature of this new Schrader Dust Cap saves time when the motorist inflates or changes his tire. Its positive action means that the dust cap will stay on the tire valve no matter how much the shocks of the road jar it.

#### Fits any Schrader Tire Valve

This convenient Schrader Dust Cap can be used on any Schrader Universal Tire Valve. All the car owner

has to do is take off the old rim nut, and screw on the new rim nut bushing tightly with a small wrench. This keeps the valve stem rigidly in place and holds on the dust cap.

#### Order a stock now

Supply houses are now filling orders for this new type Schrader Dust Cap. Order by number so that you will be sure of getting this No. 3751 Dust Cap.

Packed five in a box with either five No. 3752 Schrader Rim Nut Bushings for large diameter valve stems or five No. 3753 Schrader Rim Nut Bushings for small diameter valve stems on light cars. Each box retails at 50 cents.

A. SCHRADER'S SON, Inc., Brooklyn, N. Y.  
 CHICAGO TORONTO LONDON  
*Manufacturers of Schrader Tire Valves—Standard Tire Equipment*

# SCHRADER

## TIRE VALVE ACCESSORIES

# BOWSER

When a motorist sees a Bowser pump at your curb he has confidence that you will serve him well —for long years of seeing Bowser pumps has taught him that dependable stations everywhere use Bowser.

It is because of this confidence that the Bowserized station sells more oils, more accessories, more tires.

Think it over, then write for folder A-14, and let our sales-engineers help you plan larger sales.



**S.F. BOWSER & COMPANY, Inc.**  
*Pump and Tank Headquarters*  
**FORT WAYNE, INDIANA.**  
*Sales and Service Offices and Representatives Everywhere*

**TANKS DEPENDABLE PUMPS**



# Smashing all records



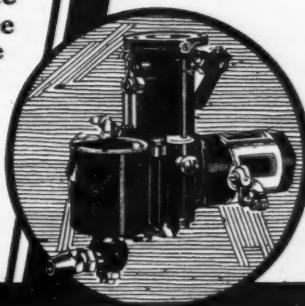
ONCE more Stromberg does it! A stock Duesenberg straight eight five-passenger touring car recently established a World's Record Endurance mark. This car was equipped with a new Stromberg Carburetor 3155 miles were covered in fifty hours, twenty-one minutes and one second—average speed of 62.63 miles per hour. It was a non-stop affair with exception of three short halts for tire changing. Run was made under observation of American Automobile Association on Indianapolis Motor Speedway.

Wherever records are shattered—wherever great endurance tests are to be made—where engine grueling is necessary—there you'll find Stromberg furnishing the proper gas mixture; making sure of flexibility and unfailing engine efficiency in general.

On any car—under every conceivable condition—the special Stromberg Carburetor insures perfect motor performance—easy starting—more power and speed—a quick pick-up and actual economy in summer or winter—uphill and down.

There is a special made Stromberg for every car—see your dealer or write us. State name, year and model of your car.

STROMBERG  
MOTOR DEVICES CO.  
Dept. 627  
61 E. 25th Street, Chicago, Ill.



## New **STROMBERG** Does it! CARBURETOR

# GIVE HIM THE AIR

Chase Trouble with a Dependable Compressor

THE LINCOLN HIGHWAY runs by the front door of the Rosemont Tire Shop, Rosemont, Pa. As the owner puts it, "this service station works 24 hours a day and 48 hours on Sunday." Some job!

#### Dependable

It takes a mighty dependable air compressor to work "48 hours on Sunday," giving air to the machines that run on the Lincoln Highway. And the Rosemont Tire Shop has a dependable compressor—a Franklin Money Saving Compressor.

#### Why?

The Franklin is dependable because of its simplicity. Note the clean deck—free from complicated parts. Nothing put on to make it look expensive, and every part as strong and durable as it can possibly be made.

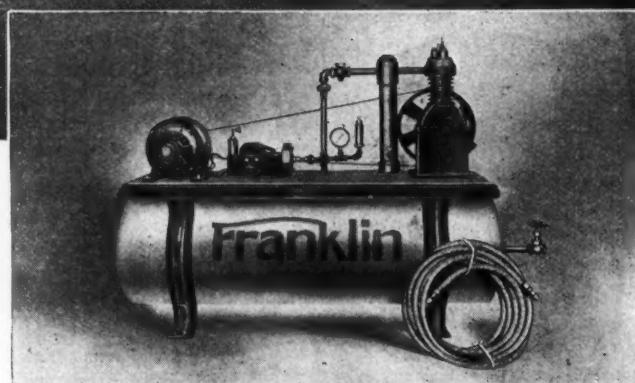
The steel deck and legs are cold-formed from sheet steel. No cast iron. This insures strength! The air line manifold is of special design, made of malleable iron, and is leak-proof. Can you see any T or L joints or nipples, the kind that usually set a fellow crazy when they get leaky? Not a one! Then there's the oil-separator, also specially designed to absolutely prevent oil and sediment from entering the air hose or tires.

#### Made for You

The Franklin will meet all your requirements, for it is made in only one size, able to take care of a 120-car garage as easy as falling off a log. Because of this one size you can buy a Franklin at an extremely low cost—\$225. The tank that you see has a capacity of 32 gallons—real capacity—measures 14" by 48", and is tested to 300 pounds hydraulic pressure. The air hose is 25 feet long with steel armor,  $\frac{1}{4}$ " globe valve and Schrader chuck as regular equipment.

#### The Unloader

One of the big features of the Franklin is the unloader, or valve lift. It is worked by a simple cam and allows the motor to start without a load, free from pressure, something that an ordinary



compressor doesn't do. At low speed the unloader opens the intake valve. As she speeds up centrifugal force throws the unloader out of action and the valve closes. Compression starts then, and then only. All this happens in twenty seconds, but in that time you save enough on your current to pay for your compressor in a short while.

#### Around the World

If your garage or service station is in Miami or Seattle, you always have service available for the motor used in the Franklin outfit. It's a dependable General Electric motor, subject to regular G. E. repair service anywhere. Supplied for alternating or direct current.

#### No Lost Power

Notice the belt running from the motor to the compressor. It is 2-inch, 3-ply tested special rubber, and it is installed to give you maximum service with maximum power. It is taut on the under side, with the greatest possible distance between pulley centers. This gives greater traction, eliminates belt slipping, doing away with the need for an idler, which eats up power, requires constant oiling and wears out the belt.

Full stock of parts of motors, compressors, automatic switches, etc., are carried at the factory and by jobbers.

#### Why to Buy

The Franklin is a compressor with many exclusive advantages. Its low cost (\$225), its simplicity (no unnecessary parts), its long life (every part strong and durable), the unloader (allowing the motor to start without a load)—these things make it the best for you. A Franklin in your garage or service station means freedom from compressor troubles, money saved, and years of dependable service.

Now is the time to order your Franklin. Do not wait until your old compressor gives you more trouble. Write today for full details of the Franklin Money Saving Compressor.

# Franklin

FRANKLIN AIR COMPRESSOR WORKS

# Money Saving AIR-COMPRESSOR



2604 MAIN ST., NORRISTOWN, PENNSYLVANIA

SEND THIS COUPON ← →  
FOR FULL SPECIFICATIONS

Tear out and mail today to—

FRANKLIN AIR COMPRESSOR WORKS - 2604 Main Street - NORRISTOWN, PA.  
Write your name and address in space below:

# McQUAY-NORRIS

## PISTON RINGS

## PISTONS

## PINS

*and now*



## BEARINGS

Bronze-back Babbitt Lined, and Die-cast Babbitt Bearings for connecting rods and crankshafts. Each half-bearing stamped with the "McQuay-Norris Victor" name. Each pair packed in an individual box. Look for the round, blue box with the distinctive McQuay-Norris label. It insures quality.

When you need bearings—for connecting rod or crankshaft—you can now obtain them of McQuay-Norris manufacture. They will measure up in quality to the same standards which have earned leadership for McQuay-Norris in the field of Piston Rings, Pistons and Pins.

McQuay-Norris Victor Bearings are made in two types: Bronze-back Babbitt Lined, and Die-cast Babbitt. They conform in every dimension and particular to each motor's own specifications. They exactly duplicate the motor builder's original bearings. In quality of material, accuracy of workmanship and inspection, and in such details as packing, they are ideally suitable for the replacement trade. Each pair is packed in a sturdy, round, blue box, which prevents the bearings from being damaged or marred in stocking and shipping.

Jobbers, dealers and McQuay-Norris Service Stocks that now supply McQuay-Norris Piston Rings, Pistons and Pins will find it profitable to sell McQuay-Norris Victor Bearings. They will prove just as profitable as all the other McQuay-Norris products. Ask your jobber's salesman about McQuay-Norris Victor Bearings, or write our Dept. M direct.

McQuay-Norris Mfg. Co., General Offices: St. Louis, Mo. Connersville, Ind. Indianapolis, Ind. Toronto, Canada

### McQuay-Norris Piston Rings

Leak-Proof . . . \$1.25 per ring

In Canada, \$1.50

Superoyl . . . \$1.00 per ring

In Canada, \$1.25

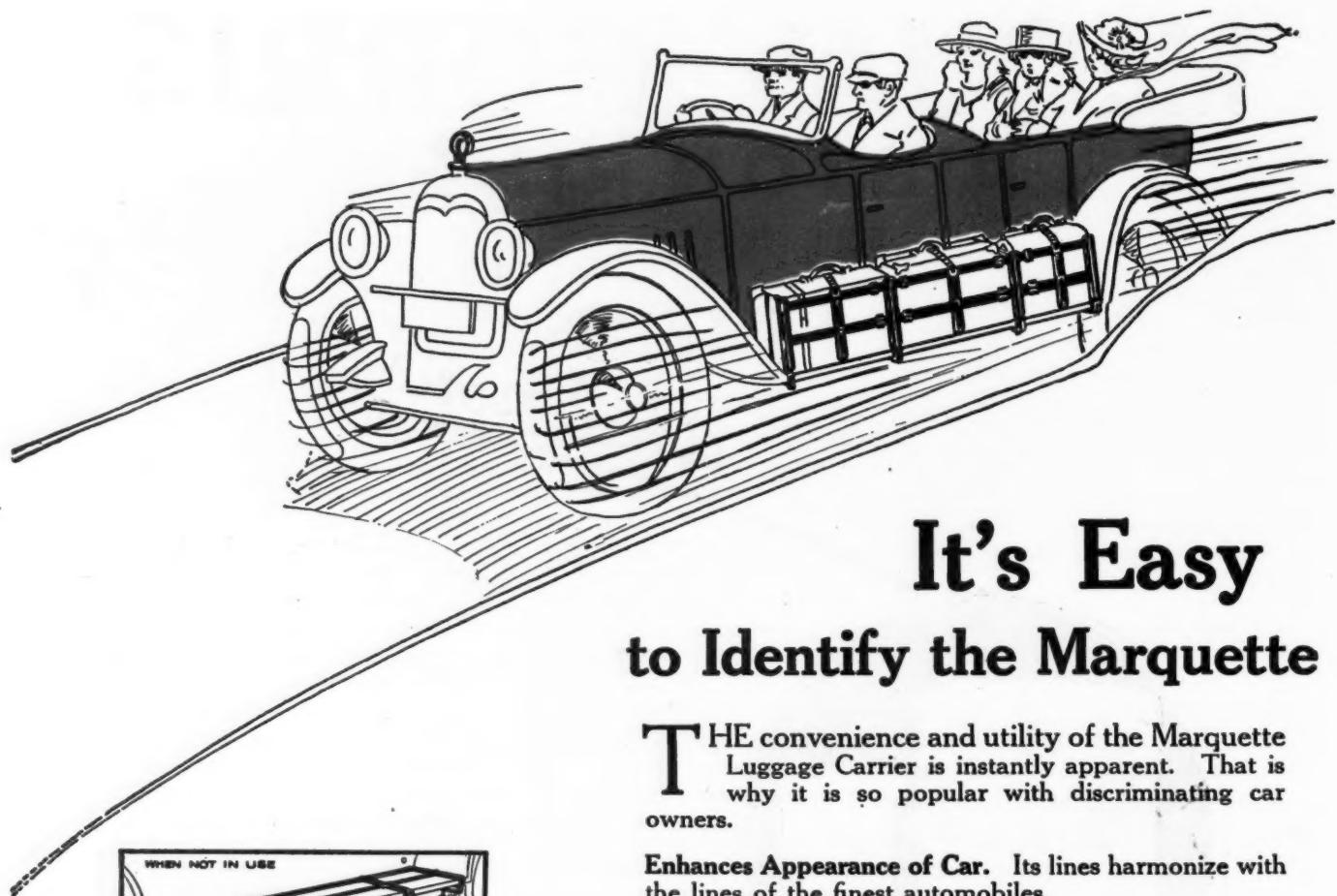
Jiffy-Grip . . . 50c per ring

In Canada, 50c

Snap Rings . . . 25c per ring

In Canada, 30c





## It's Easy to Identify the Marquette

THE convenience and utility of the Marquette Luggage Carrier is instantly apparent. That is why it is so popular with discriminating car owners.

**Enhances Appearance of Car.** Its lines harmonize with the lines of the finest automobiles.

**Prevents Marring of Finish.** Luggage is strapped to Carrier and held absolutely stationary. The strong web straps are held securely to carrier by an ingenious steel clamp. Straps are 60 inches long.

**Folds Down Flat,** on running board, when not in use. No need of taking it off or adjusting it. Simply raise it and it is ready for use.

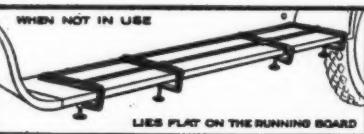
**Built for Service.** The Marquette Luggage Carrier is built of special high-grade steel. The uprights are channel-shaped to give them tremendous strength. Finished in black enamel. 2 sizes—4 ft. and 5 ft. when extended.

**Adjustable in length.** Fits any running board. Quickly attached without tools.

**MARQUETTE MFG. COMPANY**  
St. Paul, Minn.

**Sold by Live Jobbers  
and Dealers**

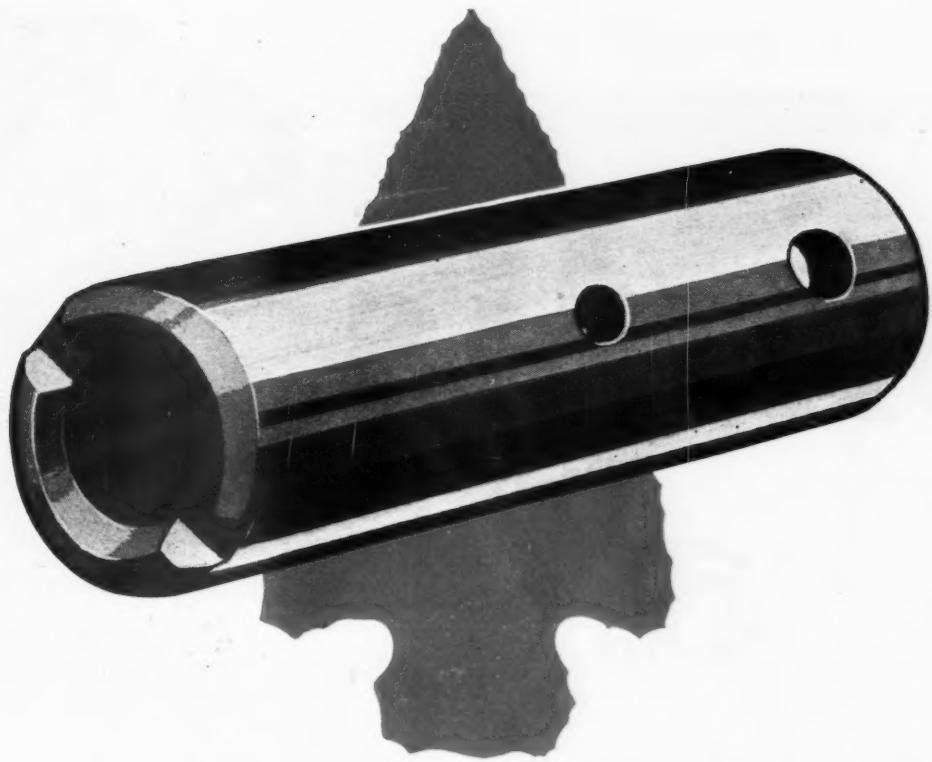
Dealers: Ask your jobber about his attractive proposition on the Marquette.



For Safety, Capacity and Convenience in luggage carriers insist upon the "Marquette."

# MARQUETTE

## LUGGAGE CARRIER



ARROW HEAD PISTON PINS are  
Quality Pins because they

*are made of solid bar stock.*

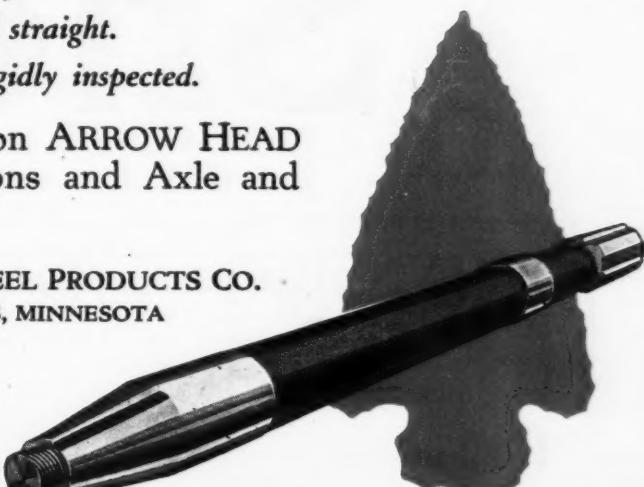
*have a soft, tough, core and  
a surface of uniform hardness.*

*are round and straight.*

*Each pin is rigidly inspected.*

You can depend on ARROW HEAD  
Piston Pins, Pistons and Axle and  
Drive Shafts.

ARROW HEAD STEEL PRODUCTS CO.  
MINNEAPOLIS, MINNESOTA



# Arrow Head Products

*The "Arrow Head" is Your Guarantee*

# What is a Well-Equipped Shop?



**"The Best-Equipped Shop  
Gets the Business"**

## BRUNNERS

are

1. Quick-Starting
2. Silent-Running
3. Fast-Working
4. Low-Costing
5. Super-Safe and

*"Good for  
Twenty Years  
at Hard Labor"*

A hard question to answer.

But a shop with a BRUNNER COMPRESSOR is well equipped in *that* respect—for twenty years!

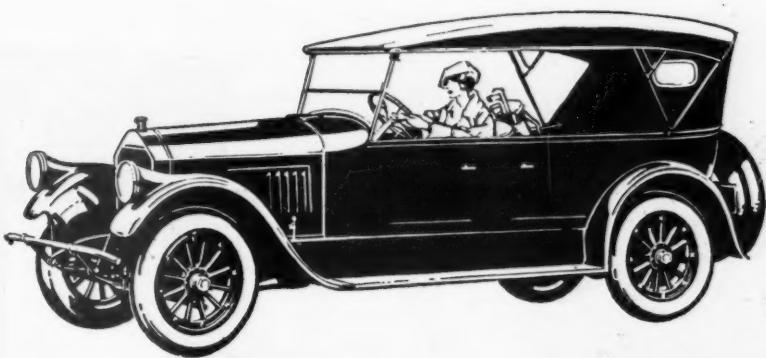
*Write for new circular just off the press—  
"Two Ways to Make Money Out of Air!"*

**BRUNNER MFG. CO., UTICA, N. Y.**

*Oldest and Largest Garage Air Compressor  
Manufacturers in the World*

*Sales Offices: Cincinnati, Kansas City, San Francisco and almost  
every jobber from Coast to Coast.*

**BRUNNER**  
AIR COMPRESSORS



# PIERCE ARROW

## THE SEVEN-PASSENGER TOURING

Ask any motorist what car he would most prefer for touring and the answer almost invariably will be—"Pierce-Arrow!" Its desirability is conceded.

Long, low hung and well balanced, the Pierce-Arrow Seven-Passenger Touring Car offers the utmost in luxurious comfort. For power—the dual-valve, dual-ignition engine!

Journey as swiftly and as far as you will, and it will be with regret and not with relief that you end the day's run.

That's why the Pierce-Arrow touring models are so salable.

\* \* \* \* \*

The demand for Pierce-Arrow cars never was so pronounced as it now is. An investigation of the Pierce-Arrow dealership might reveal opportunity you hardly thought possible.

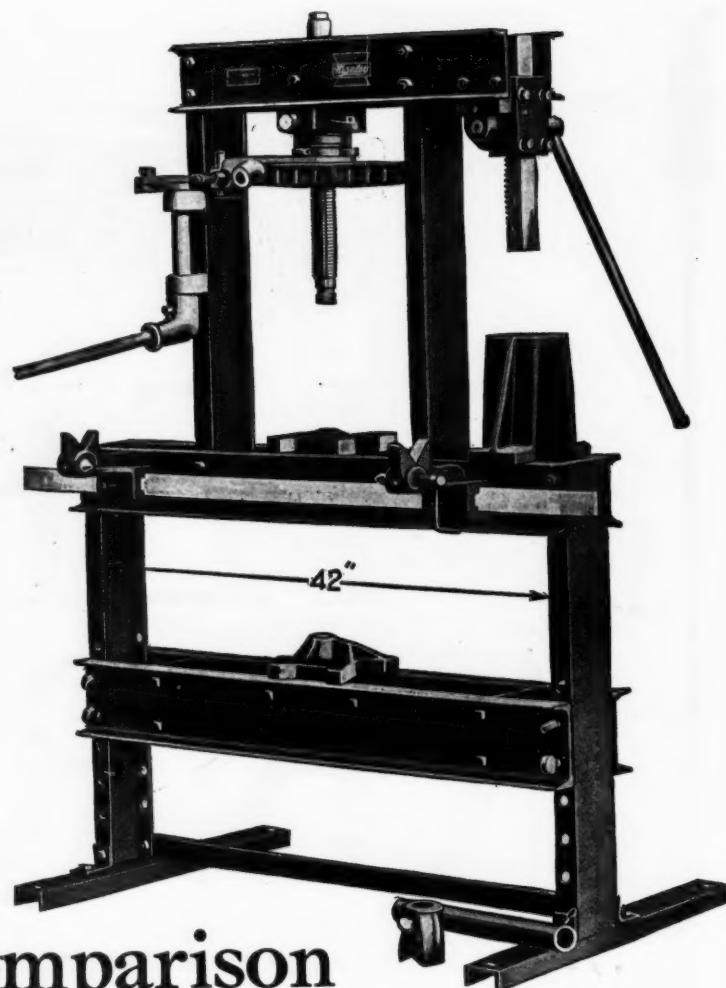
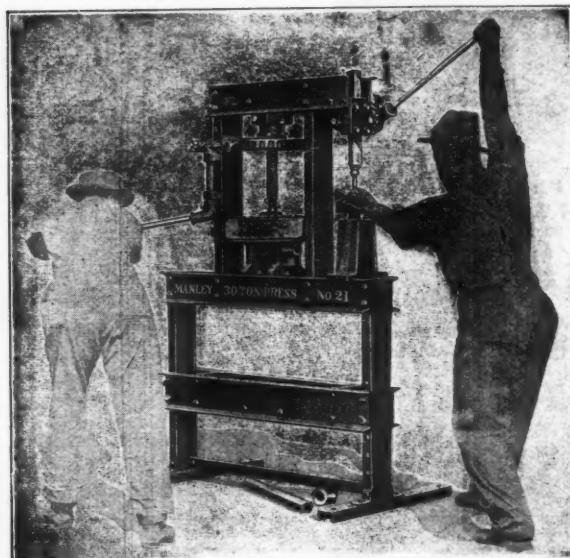
Open Cars ..... \$5250  
Closed Cars ..... 7000

*At Buffalo.  
Government tax additional.*

►PIERCE-ARROW►

THE PIERCE-ARROW MOTOR CAR COMPANY  
Buffalo, New York

**TWO PRESSES IN ONE.** Note the separate quick-acting rack-and-pinion Arbor Press in which a second mechanic can do all sorts of lighter press work without interfering with the job under the screw.



## Getting a Press? Make This Point-by-Point Comparison

Never were so many REAL features offered in an Arbor Press. Before buying ANY press, compare it, point by point, with this MANLEY.

The Manley has FOUR leverages — 180-1, 1000-1, 2400-1, 4800-1. Speedy on light work. ALL-POWERFUL on heavy work. In presses having a vertical leverage, a man's weight is his limit. With the MANLEY the leverage is HORIZONTAL—and the average man can pull at least TWICE his own weight. One man can easily pull up to 30 tons.

Press never need be bolted to floor, but may be laid over on its side when work requires it. Ratchet is SPRING-OPERATED and works perfectly in any position.

There is 42" of space between

lower uprights—and there are attachments for straightening and trueing crankshafts, axles and drive-shafts costing but a few dollars the absolute equal of any special straightening press costing \$100. There are also centres like lathe centres for checking axles, crankshafts, etc.

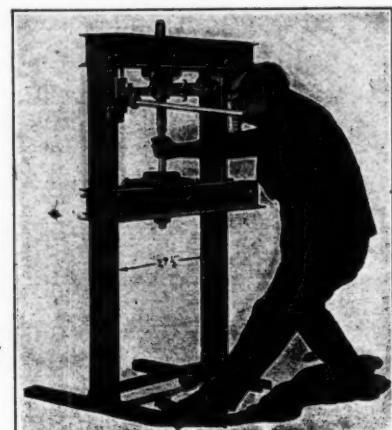
And an attachment for riveting ring-gears and the famous Manley Compression Clutch for holding long shafts in forcing gears on and off. Screw of 40-50 point carbon steel, 4-pitch ACME thread, tool-steel thrust bearing, ball bearing hand wheel, grease cup lubrication, and other refinements unheard of in other presses. 20, 30 and 50-ton capacities. Prices \$64 up. Buy from a Manley jobber. Catalog from us.

**MANLEY MFG. CO., YORK, PENNA.**

*"The Best-Equipped Shop  
Gets the Business" with*

# Manley Garage Equipment

MADE IN YORK, PA.



*Operating lever of screw in NATURAL WORKING POSITION. Mechanic can see the job, hold it and steady it, pulling with the other hand. (The Manley Press shown here is our 20-ton size. Has but one work-table, but otherwise is similar to the larger sizes.)*



## Let the Motor "Speak for Itself"

It is so easy to locate motor troubles when the car is equipped with a Cooper Special Motor Testing and Carbon Outlet Valve. The time and money saved is appreciated by the customer and there's less chance of a misunderstanding.

Garage men like to work on a car that's well taken care of. Thousands of them recommend the "Cooper" Valve because it keeps the motor clean and sweet, gives a free exit for carbon. To clean a fouled motor loosen the carbon with alcohol or commercial carbon remover and blow it out through the "Cooper" Valve.



**\$250**

### Cooper Dash Control

Gives instant and complete control of Carbon Outlet and Testing Valves, exhaust heater valves, air chokes, radiator shutters. Right at your finger tips, always in sight of driver, fits the hand perfectly; a twist of the wrist locks it in any position.

The Cooper Dash Control does not interfere with levers, pedals or floor board—a feature liked particularly by men who service batteries. Installed by cutting half inch hole in dash. Made of brass, polished and nickel—*an ornament to the finest car.*

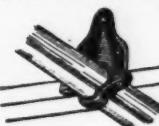
### The *Cooper* SPECIAL Motor Testing and Carbon Outlet Valve

is a finely made high grade product. The few working parts are perfectly machined and fitted. Easily attached in half an hour by cutting oblong hole in exhaust pipe and fitting cutout around it—not necessary to cut exhaust pipe in two.

Extra heavy spring and rod axle keep the valve from chattering. A size to fit every car. Standard equipment on Paige Daytona Model and other fine cars.

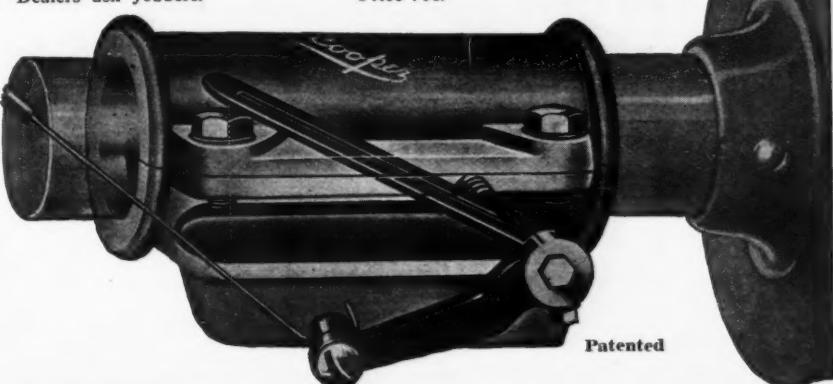
PRICES	VALVE ONLY
1 1/2 in.	\$2.50
1 1/2, 1 3/4, 1 7/8	3.00
2, 2 1/4	3.50
2 1/4, 2 3/4, 2 1/2	4.00
2 3/4, 2 7/8, 3	5.00
Cooper Valve complete with pedal for Fords	3.00

When Cooper Testing and Carbon Outlet Valve is ordered complete with Dash Control, add \$2.50 to above prices. Add 10% to these prices on Pacific Coast. Ask your Dealer. Dealers ask Jobbers.



### Cooper Steering Column Support for Fords

Holds steering column absolutely rigid. Takes out all vibration from steering wheel. Adds greatly to comfort of driving, especially over rough roads. A strong casting, black finish. Fits all Fords having instrument board, both open and closed models. Packed in individual cartons. Price 75c.



Patented

Manufactured by

## Cooper Mfg. Co.

Dept. 15-C

Marshalltown, Iowa

## The Fulton Company

Sales Representatives

75th and National Aves. Milwaukee, Wis.



# Cooper

## Super Size CORD

### ROLLS UP PROFIT VOLUME

In the extra size of Cooper Cords there is a mint of profit for the tire dealer who can sell, rather than merely stock a quality cord tire of better-than-usual strength and mileage capacity. Giving more tire for the money is a strong factor in the success of Cooper dealers. No one selling any other cord tire can give better quality than Cooper, and hence Cooper super-size frequently closes a sale which would otherwise be lost.

When Winter comes and tire sales fall off, Cooper Batteries sell best and with Cooper Cords give Cooper dealers a a year 'round profit. Write today for the Cooper proposition, and for details of the remarkable new Cooper Rubber Enclosed Battery for FORDS.

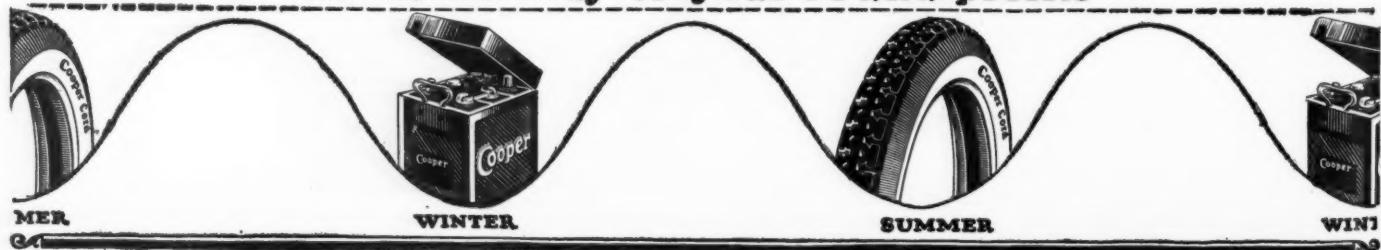
**THE COOPER CORPORATION**

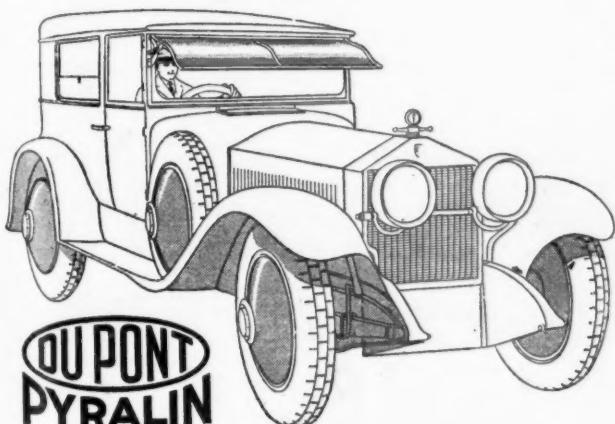
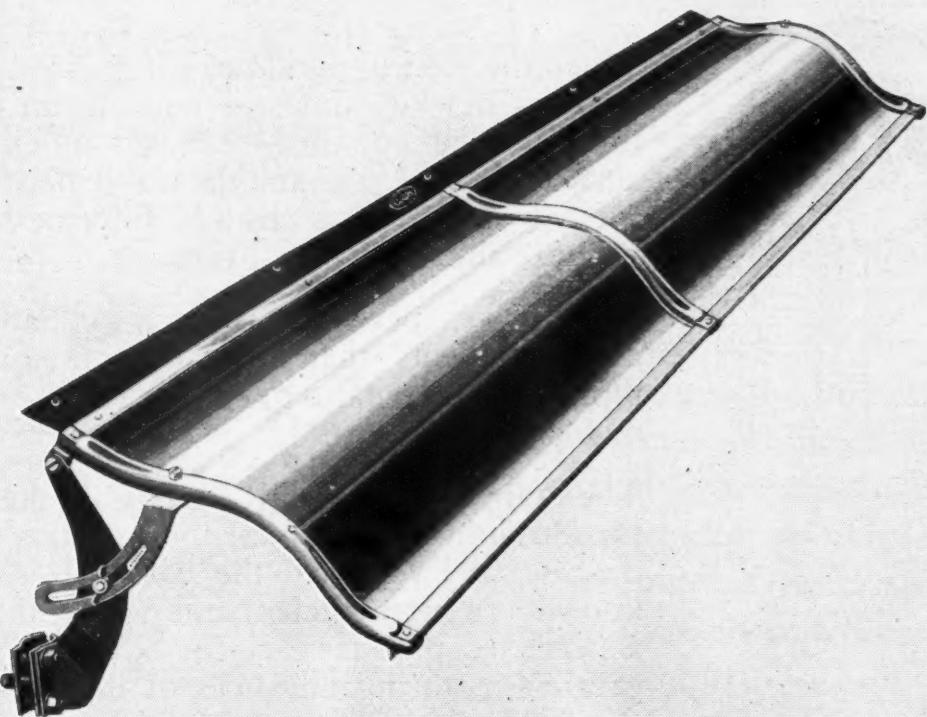
General Offices:  
Cincinnati, Ohio

# Cooper Products

## TIRES BATTERIES

"Level the way to year 'round profits"





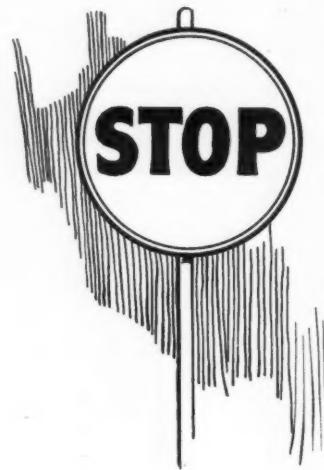
# The New Blue **PREMIER**

The triple curve Pyralin Vizor. Lighter and neater than glass, and will not break—the best transparent vizor.

It has proved its popularity. Fast multiplying sales are taxing the capacity of our factory. The new blue **PREMIER** and its popular price—\$7.50 have caught the fancy of the motoring public. Combines beauty and distinctiveness with strength and service. Fits all makes and all models—open or closed. If you intend to profit most by the sales of this popular vizor place your order with your jobber *today*. Also furnished in green and amber Pyralin.

**GRIGSBY·GRUNOW·HINDS·CO.** 906 W. LAKE ST. CHICAGO

# Why Not Merchandise Safety?



*The ability to stop quickly, suddenly if necessary, is more vital to a motor car than speed or any other single factor.*

*No car in the world can stop as quickly or as safely as the Duesenberg with its Four Wheel HYDRAULIC Brakes.*

*There is a more vigorous, vital demand for such safety every day. With the Duesenberg alone you can merchandise genuine safety.*

When the weekly periodical of greatest circulation devotes almost a page to an editorial on the appalling 120,000 motoring accidents of the year and the tragic need for safety, you can surely sell SAFETY to those who are able to pay the price.

More newspaper space is given to "Safety" and "Accidents" than to any other motoring topic. It is on the lips of every citizen, every motorist.

The Four Wheel HYDRAULIC Brakes of the Straight-Eight Duesenberg make this the SAFEST vehicle in the world. It is also known as a most efficient and powerful car, a perfected product that embodies the two greatest motoring advances of the decade. Absolute safety at any speed the motorist demands is an assured fact.

What price will the leading men of your town pay for safety to themselves and their families? There may be just a handful of such men in your city. That is enough. Many sales of quality cars of conventional design would not net you such satisfactory business as the sale of a few Duesenbergs. **WHY NOT MERCHANDISE SAFETY?**

DUESENBERG AUTOMOBILE & MOTORS Co., INC.

INDIANAPOLIS, U. S. A.

**D U E S E N B E R G**  
*The Original Straight-Eight*  
*With Four Wheel HYDRAULIC Brakes*

# Lockheed Hydraulic Four Wheel Brakes

## The Sensation of the Industry

The significance of the proven, outstanding success of Lockheed Hydraulic Four Wheel Brakes in the hands of hundreds of individual owners, is fully appreciated by engineers and others who keep informed on important motor car developments.

Many sales managers already recognize Lockheed Hydraulic Brakes as the biggest demonstrating and sales feature that can be put on a motor car.

Of course, one of the things which has attracted so much attention to Lockheed Hydraulic Brakes is the fact that a ride in a Lockheed-equipped car is an entirely new and positively sensational experience to any motorist.

The points of Lockheed per-

formance which interest motor car manufacturers and engineers are features which Lockheed Brakes carry to new heights of efficiency.

Among these features are the ease with which these hydraulic brakes of American invention and development are applied; the perfect equalization of braking to all four wheels, due to the hydraulic principle, and the unequalled quickness and smoothness with which a car can be stopped.

Twelve leading motor car manufacturers have for some time been actively working with the Lockheed organization.

**Hydraulic Brake Company**  
700 Harper Ave. Detroit, Michigan

# LOCKHEED

## Hydraulic Four Wheel Brakes

# GATES BELTS

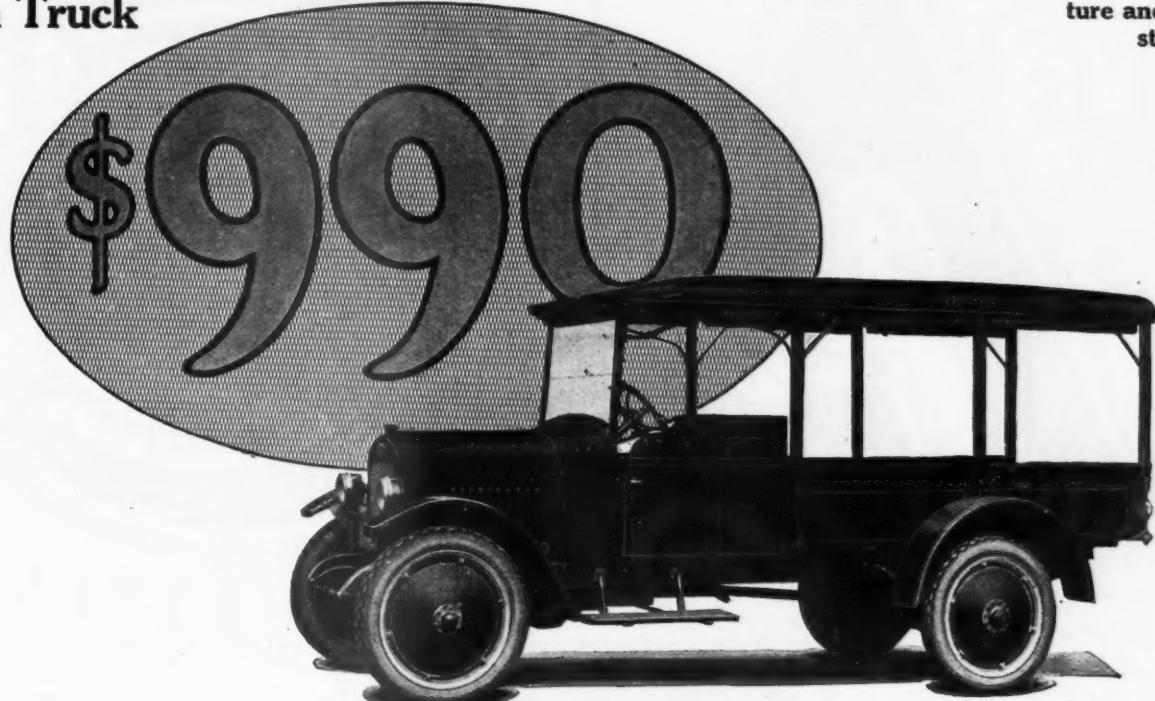
*"The Standardized Fan Belt"*

In hot weather especially sell your good customers the fan belt that really grips the pulley. That's the Gates Vulco Belt—and the reason is the bias weave construction (patented).

Made by the World's Largest  
Manufacturers of Fan Belts.

## The New Stewart 1-Ton Truck

Backed by 10 years of successful truck manufacture and financial stability



New Stewart 1-Ton Truck, With Body and Complete Equipment as Illustrated, \$1185, F. O. B. Buffalo

## All Parts of Country Wiring for Carload Lots

*New York sold 42 in 3 days. Chicago sold 21 in 4 days. Cleveland sold 27 in 5 days. Worcester, Mass. sold 6 the first day. Philadelphia sold 26 in 2 days.*

The New Stewart 1-Ton Truck is the biggest selling sensation in the truck industry. The Stewart factories are working at full speed, and making provision rapidly to double production.

Live dealers who want to make money will act promptly to secure some of the good remaining territories.

### Matches Trucks Costing up to \$1800

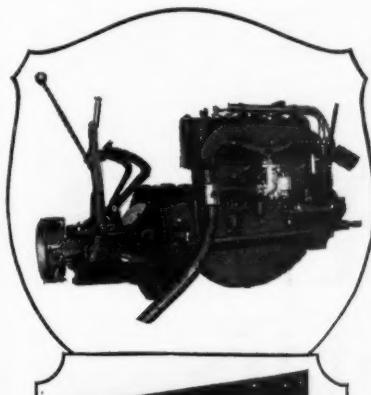
Wheelbase, 130". Loading space 8 feet. Will exceed 40 miles per hour with capacity load. Throttle down to 4 miles. Fine appearance. Unusual gasoline and tire mileage. Electric lights, starter, electric horn, tool kit and jack. Instrument board equipped with ammeter, oil gauge, starting choke, lighting and ignition switches. Disc steel wheels—Demountable rims. Non-skid cord tires 34" x 4 1/2".

*Liberal Discounts to Dealers in Small Towns*

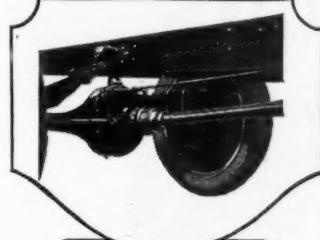
Other Sizes and  
Chassis Prices  
f. o. b. Buffalo

1 1/4 to 1 1/2 ton	\$1495
1 1/2 to 2 ton	1870
2 1/2 to 3 ton	2590
3 1/2 to 4 ton	3440

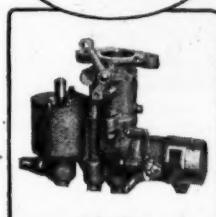
**STEWART**  
MOTOR CORPORATION Buffalo N.Y.



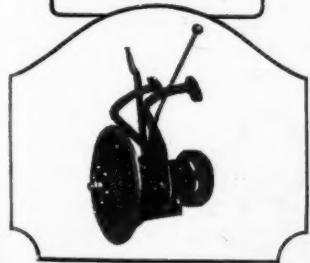
**MOTOR** — Four-cylinder, 3 3/4" bore by 5" stroke. Five bearing crankshaft. Removable cylinder head and block. Full pressure feed lubricating with automatic control for all speeds. Observe how accessible are all parts.



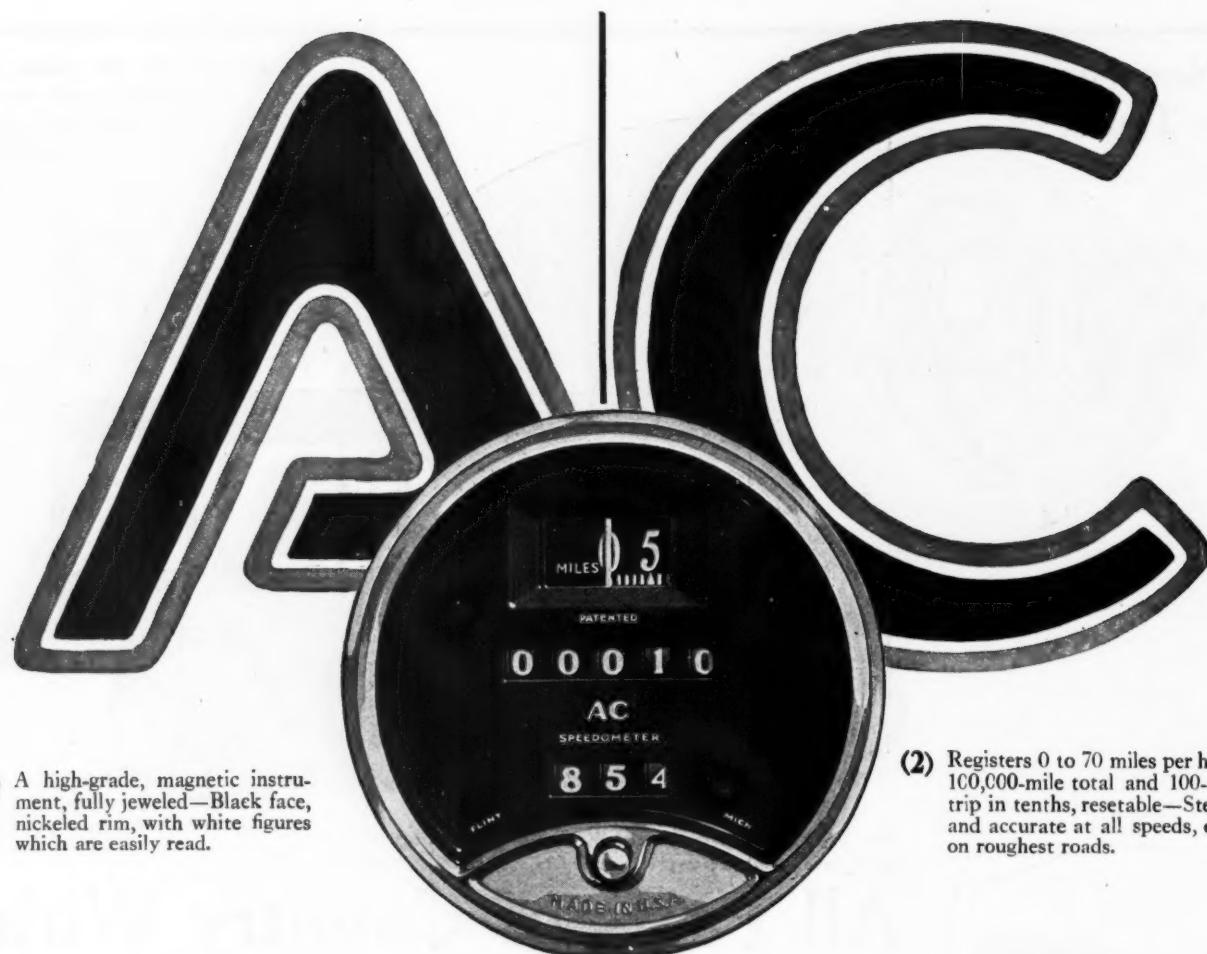
**REAR AXLE** — Truck type. Spiral bevel gear with straddle mounted pinion. Heavy type Brown-Lipe differential mounted on Timken roller bearings. Timken roller bearings in hubs also. Axle shafts 1 1/8" in diameter. Note sturdy, compact construction.



**ZENITH** Carburetor; used on finest trucks, automobiles, airplanes. Acknowledged most dependable, economical, efficient carburetor in the world.



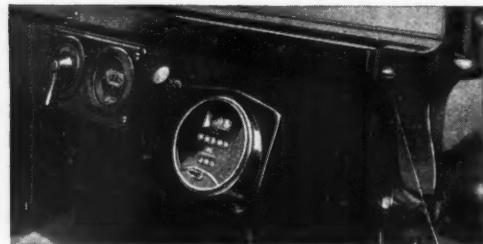
**CLUTCH** — 7 dry-plate. Multiple disc type with automatic adjustment. Unusually efficient and smooth.



(1) A high-grade, magnetic instrument, fully jeweled—Black face, nickelized rim, with white figures which are easily read.

(2) Registers 0 to 70 miles per hour, 100,000-mile total and 100-mile trip in tenths, resettable—Steady and accurate at all speeds, even on roughest roads.

# SPEEDOMETER for Fords for Stars



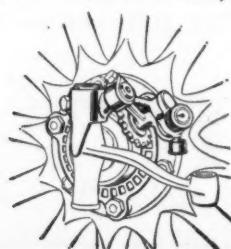
(3) Complete with all attachments for quick and easy installation. No special tools required—when installed it presents an attractive appearance and does not look like an afterthought.

(4) Driving attachment has many features—there is no swivel joint to require attention, no holes to drill and the installation is easily and quickly made.

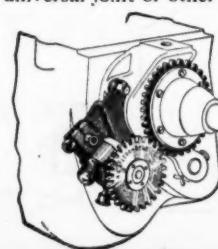


(5) Can be mounted on instrument board—as shown—or below spark and throttle levers, as complete brackets and all attachments for quick and easy installation in either position are furnished with instrument.

(6) Driving gear is attached to the drive shaft ahead of the universal joint—can be mounted without removing the universal joint or other parts.



(7) Service on AC Speedometers is rendered through the nationally located branches of the United Motors Service, Inc.



# More Than Half the Automobiles Manufactured Are Ford and Star Cars

*—all being turned out without a speedometer*

Every motorist not only wants but needs a speedometer. The desire to buy exists—it is simply up to you to complete the sale.

This opportunity affords you one of the biggest fields for immediate and continued profit in the accessory field.

Connect your store with AC's national advertising on AC Speedometers by prominently displaying the AC Speedometer poster on your window, the attractive display stand on your counter, and by making use of the other sales helps offered.

#### *Quoted from* PRINTER'S INK:

There must be good team-work between advertising and selling.

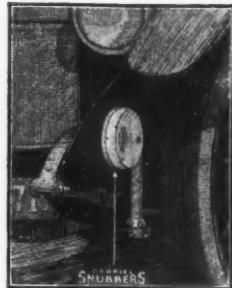
Advertising leads prospects to the water but it cannot always make them drink—it takes a certain amount of sales effort on the part of the dealer to do that.

The maximum cannot be obtained from advertising except when the retailer follows up the interest that it creates.

## AC Spark Plug Company

FLINT, Michigan

*Makers of AC Spark Plugs—AC Speedometers*



LET A MOTORIST once own a car equipped with Gabriel Snubbers—and from that time on, while he may change his mind as to the type or size of car he wishes to drive, he will never change his mind about the value of Gabriel Snubbers and the need of them on *every* car. 37 cars are standard-equipped and the manufacturers of 34 others put holes in frames for them.

*Sold by Legitimate Dealers*

THE GABRIEL MANUFACTURING COMPANY  
1415 East 40th Street . . . . . Cleveland, Ohio

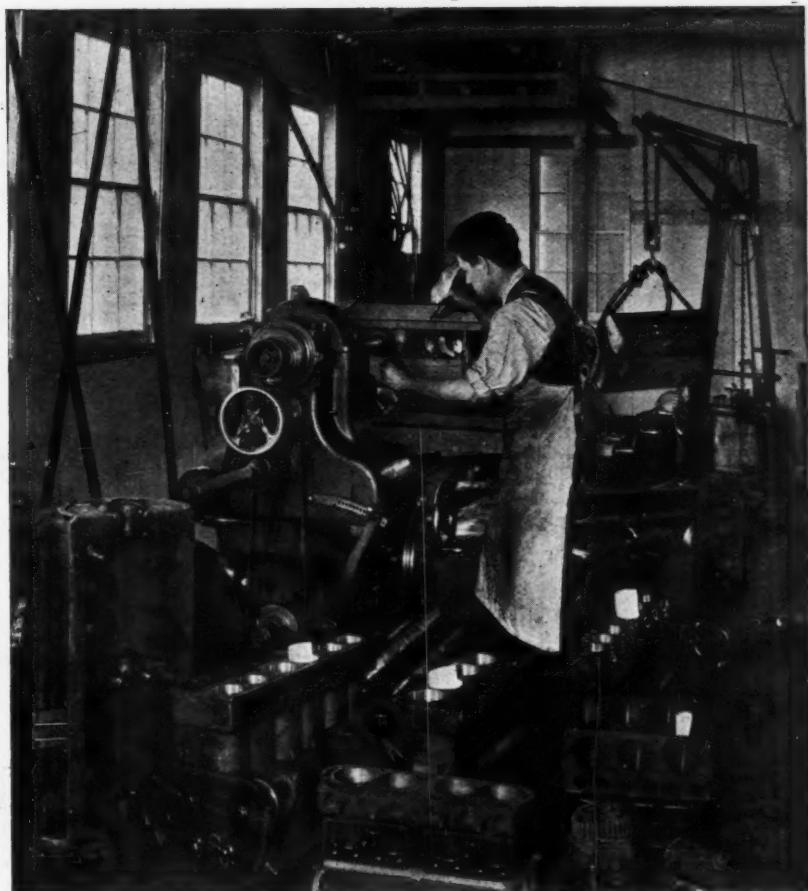
Keep You on the  
Seat  
Save Your Car

GABRIEL  
**SNUBBERS**  
THERE IS NO OTHER

If it's a Snubber  
—it's a  
"GABRIEL"



# This Modern Re-Grinding Shop— A 100% LANDIS Installation!

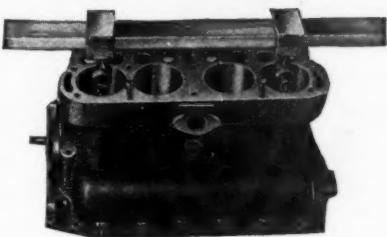


**I**N the shop of the PRECISION MOTOR REGRINDING CO., Hohokus, New Jersey, it's all Landis Cylinder Grinding Machines and Landis 4-A Special Grinding Machines for crankshafts, pistons, pins, etc. Re-grinding work of all the garages and repairshops for miles around finds its way into this modern shop.

In all parts of the country, RE-GRINDING SHOPS are being established to take care of the constantly increasing need for REAL re-conditioning of motors. In many of these, the equipment is 100% LANDIS.

The Landis Cylinder Grinding Machine is extremely SIMPLIFIED, built to uphold the LANDIS reputation for Accuracy and Speed. Exceptional means for shifting from one make of bloc to another. Full control from one position. Every time-saving feature.

We are the largest manufacturer of grinding machines and due to our long years of experience and volume, are able to set a PRICE that will prove exceedingly interesting to those considering getting into this money-making business. The Landis catalog is yours for the asking.



*The Landis Centering Bar adjusted to a cylinder bloc. This is done before the casting is put on the machine.*

**LANDIS**

**LANDIS TOOL CO., WAYNESBORO, PENN.**

New York Office: 51 Chambers Street

# INSHIELD SPOTLIGHT

## NO GLASS TO CUT!

YOU can attach an Inshield Spotlight in five minutes. A hand drill is the only tool you need. Two holes through the windshield frame, a twist on the wing nuts and the job is on.

The motorist likes this convenient, powerful light that can be attached without mutilating the

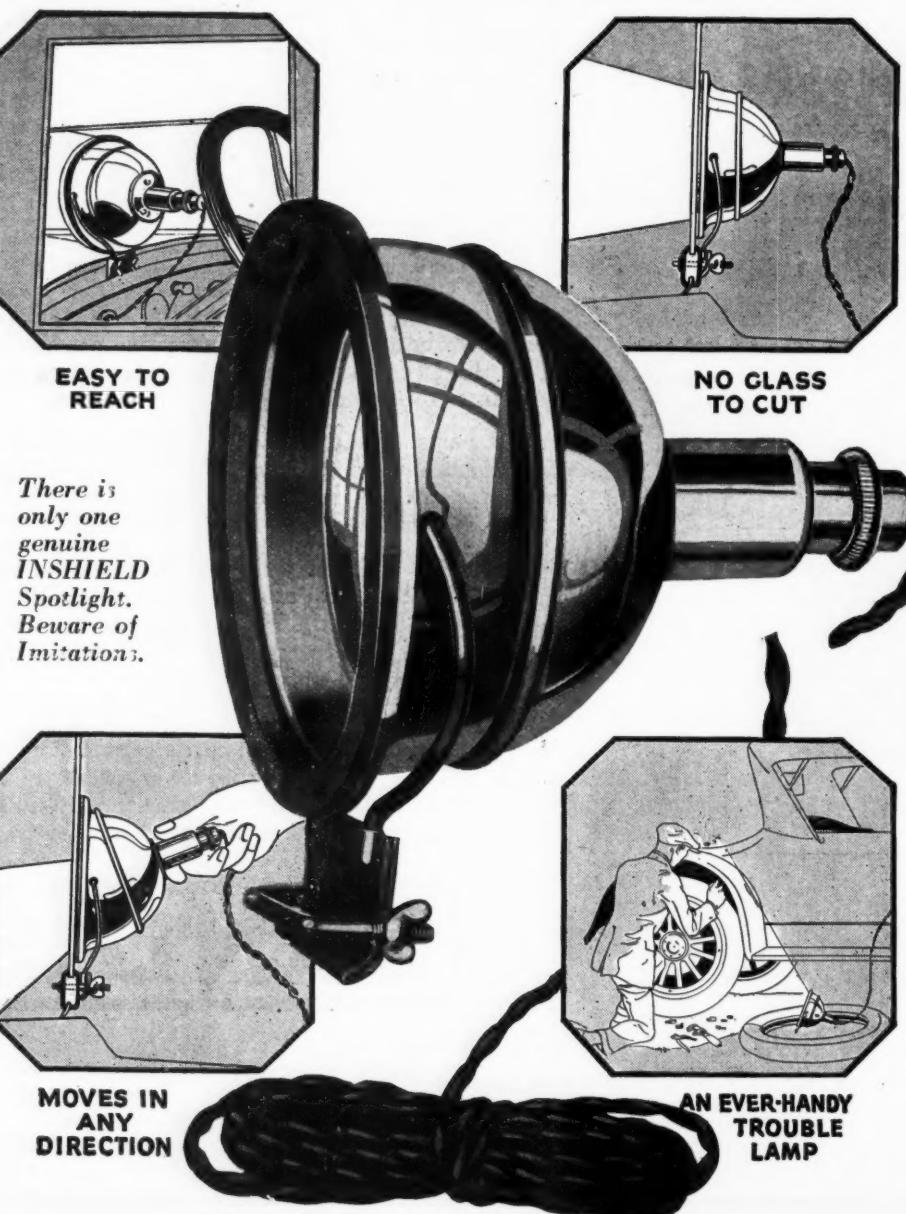
windshield and which adds class to the looks of the most distinctive car.

Distribution through legitimate jobbers has always been the Inshield sales policy. Buy Inshields from your jobber.

*Made only by*

**THE THAL & BITTER MACHINE CO. Inshield Division, TOLEDO, OHIO**

*The Inshield is the one perfect spotlight. It fits snugly against the windshield, out of the dust and weather. It doesn't interfere with the opening of the windshield to any position, and it functions with equal efficiency at whatever angle the windshield may be. Detached in four seconds for use as a trouble lamp. Wire enough to reach any part of the car.*



*The Inshield fits any car. Fastens to either top, bottom, or side of the windshield. Guaranteed not to rattle. Absolutely no back glare. Entire light is beautifully made of sheet brass heavily nickel plated. Equipped with a National Mazda tipless precision type bulb. Can be pointed up, down, right or left. Motorists everywhere are buying it. Jobbers and dealers with Inshields to sell are doing an amazing business.*

# The Troy Trailer & Wagon Company

*All Repairs Strictly Cash*

HIGH and SLOW  
SPEED TRAILERS

BOTTOM DUMP &  
FARM WAGONS

*Troy, Ohio*

June  
21st,  
1923.

TO THE AUTOMOTIVE DEALER:

Every prospect you have wants to know how he can cut his transportation costs, before he is interested in buying new equipment.

When you talk of savings and earnings first, and spending afterwards, you have a sale half made.

With TROY TRAILERS for your background and the possibilities they offer in transportation problems, you can show your prospect how to make money by spending.

ECONOMY is the best selling argument at all times, and TROY TRAILERS fit trucking requirements so closely that hauling costs can be reduced to a minimum.

TROY TRAILERS will help you sell trucks, and trucks will help you sell TROY TRAILERS.

It makes little difference what the trucking requirements may be, there is a TROY TRAILER that will handle the job---in short, when it is all simmered down, what we are actually selling is TRANSPORTATION.

Think this matter over, and let us hear from you by return mail.

Yours very truly,

THE TROY TRAILER & WAGON CO.

BY: *O. N. Peters*  
Sales Manager.

CNP:GMP



# MULTIBESTOS

*"The brake lining  
with the  
interlocking  
weave"*



## BRAKE LINING

THE car owner knows just two things about a brake lining—how it *takes hold*, and how it *lasts*. Give him a lining that *you know* will do both these things and you make him a satisfied customer.

Multibestos takes hold and gives long service, for a very good and real reason—its *interlocking weave*.

Fine strands of long-fibred yarn and brass wire are woven together firmly and closely by a special Multibestos method that securely interlocks each strand with the other.

It is this *interlocking weave* that binds Multibestos into a fabric of enduring ruggedness that cannot be pulled apart. And gives Multibestos its ever dependable gripping power that swiftly and smoothly brings the car to a stop.

**"How to  
reline brakes  
in 90 minutes  
or less"**

For applying linings to external brakes, Multibestos provides the most economical, practical method ever invented. Linings are put on without need of removing brake band. Write for interesting booklet.

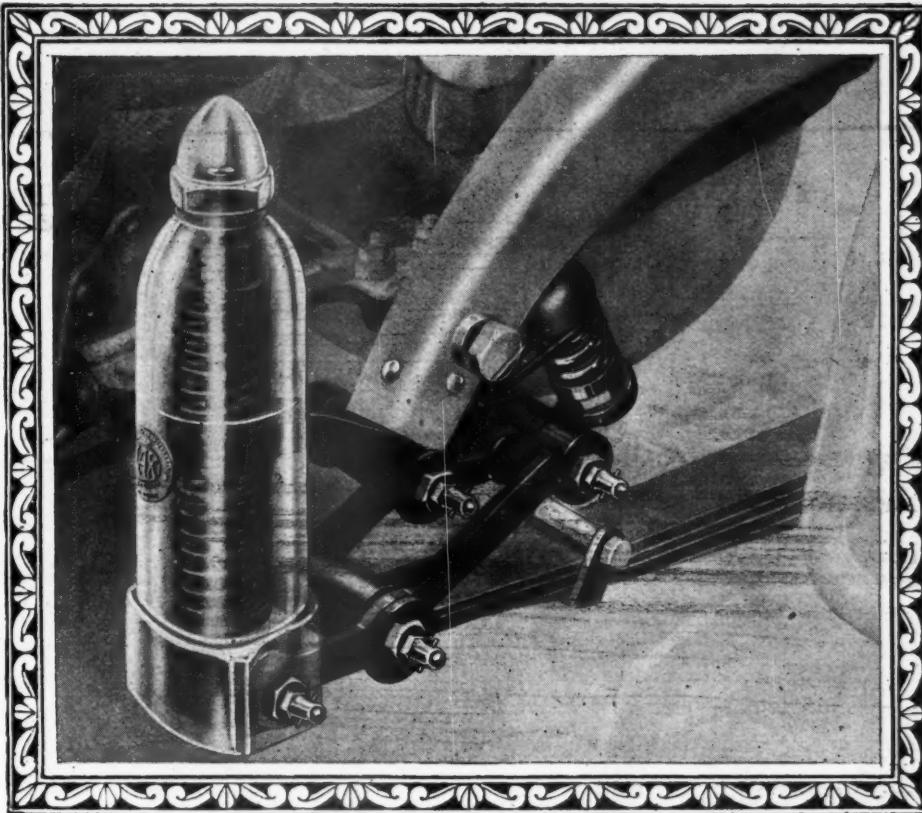


MULTIBESTOS COMPANY

WALPOLE, MASS., U. S. A.

Branches:

NEW YORK CHICAGO NASHVILLE DETROIT SAN FRANCISCO



## Does Double Work —insures double sales

AJAX is in demand by both classes of car owners—those who want a shock absorber, and the others who want a device to check the recoil.

In either case you can sell AJAX, for AJAX not only cushions the impact, but checks the recoil as well. And your patron gets an extra feature of riding comfort—at no extra cost.

AJAX is the only device on the market that can handle BOTH jobs in one compact unit—compensating smoothly and with-

out sidesway for all irregularities of the road and the recoil they cause.

Easily installed. No cutting. No drilling.

AJAX Shock Absorbers are popular with car owners because they afford permanent riding comfort and always look nice. Dealers like to handle them because they are popular and sell fast.

Get the franchise for your territory. But first write for the details of our interesting proposition.

BREWER-TITCHENER CORPORATION, Cortland, N.Y.  
Manufacturers of Automobile Parts and Accessories

DEALERS: Our illustrated descriptive data will interest you. So will the discounts. Write for details.

—\$35 a pair —  
\$40<sup>00</sup> Far Western States

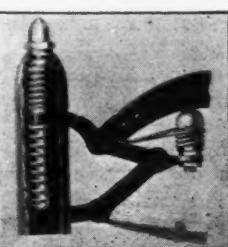
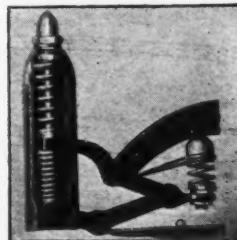
"Bears the Brunt of the Bumps"

# AJAX

## Shock Absorber

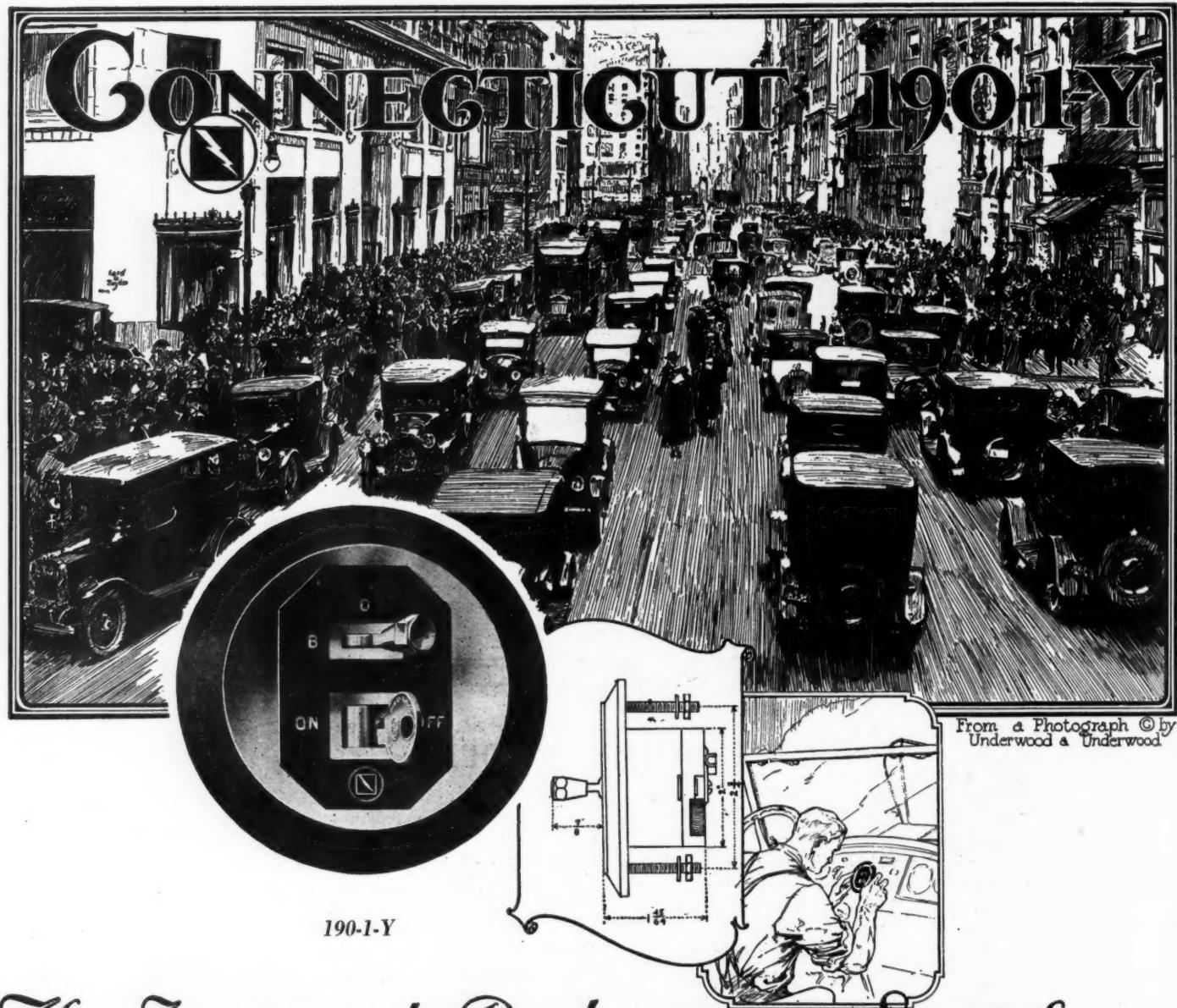
### IMPACT POSITION (cushioning)

Lower spring compresses,  
upper spring expands, neu-  
tralizing force of the blow.



### RECOIL POSITION (checking)

Lower spring expands, upper  
spring compresses, setting up  
a strongly increasing check.



## The Universal Replacement Switch

HERE is the most practical solution to your problem of meeting the demand for replacement switches.

Instead of guessing how many different switches you should carry—

Instead of tying up a lot of money in a stock of each—

Instead of finding yourself overbought in one kind and underbought on another—

Instead of seeing the carrying charges on slow movers eat up your profits on ready sellers—

Put in a working stock of CONNECTICUT 190-1-Y Universal Replacement Switches.

A beautiful switch—one that will improve the appearance of any dash.

Matches other items of equipment—

Goes on any dash—wood or metal—

Works with any lighting arrangement.

Lock approved by Insurance Underwriters' Laboratory.

### CONSTRUCTION

The switch block of Cetec is mounted on a heavy cast aluminum plate, highly polished and finished with a black enamel. Equipped with mounting studs of generous length.

### OPERATION

The lighting control lever snaps into its Bright, Dim and Off positions with a crosswise toggle action.

For the ignition control, the key of a high grade change pin tumbler lock is used instead of a lever. The ignition cannot be switched on without the proper key. Key cannot be taken out while the ignition is on. Removing key (when in Off position) automatically locks car against theft.

Never before has any ignition-lighting control combined such beauty, and practicability with anything like the merchandising possibilities of this master replacement switch.

Packed complete with mounting instructions

Price \$4.50

Send for Connecticut Accessory Bulletin No. 70

 **CONNECTICUT**  
MERIDEN

TELEPHONE  
& ELECTRIC

**COMPANY**  
CONNECTICUT 

Automotive Division



# More speed and power with a **WEAVER** Auto Crane because of this compound gear construction.

HERE'S a nice profit on towing work waiting for you the minute you mount this Weaver Auto Crane on your service car and tell car owners in your neighborhood about it.

When you start out on a job with a Weaver Crane you have the satisfaction of knowing that, no matter how difficult it may be, the compound gear construction will enable you to handle it in a quick, business-like way, at a worth while profit.

You can adjust the chain to the load in a jiffy by applying the crank to the lower auxiliary shaft, which revolves the drum over three times faster than the upper shaft. When greater power is needed to elevate the wrecked car into position for towing, simply change the crank to the upper shaft, which enables loads up to 4,000 lbs. to be elevated with ease.

Write today for special circular on our Auto Crane and booklet describing our complete line of garage equipment.



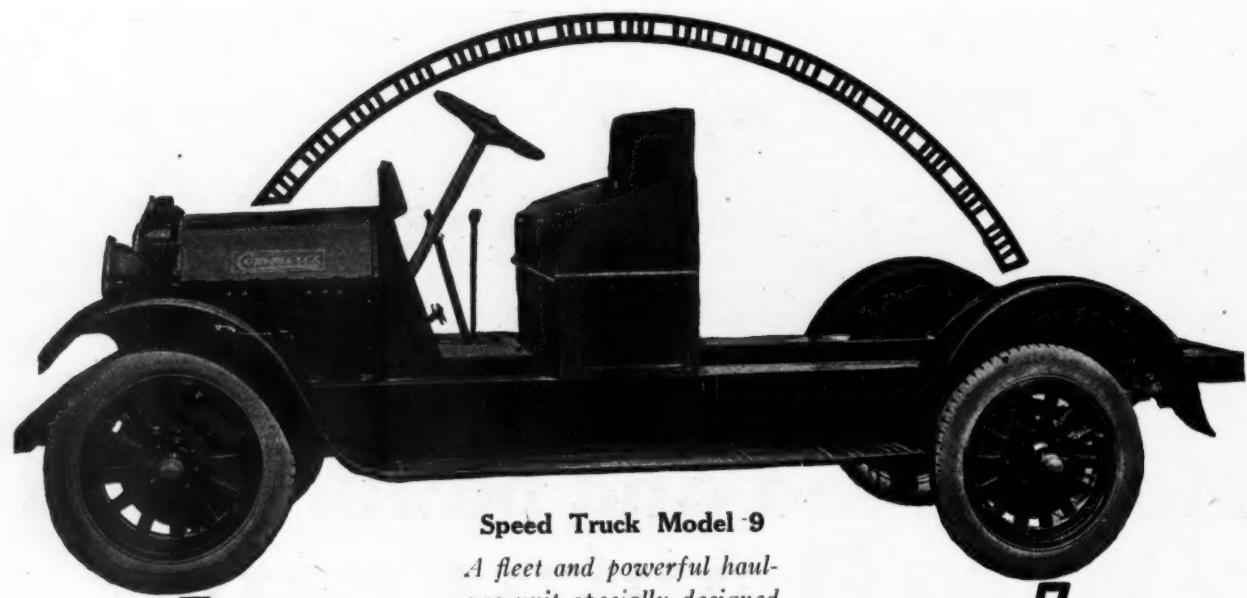
**WEAVER MFG. CO.**

Springfield, Illinois, U. S. A.

Weaver, Canadian Co., Ltd.  
Chatham, Ontario

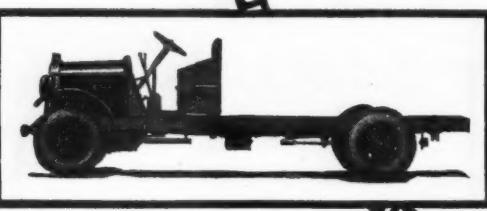


"The Best Equipped Shop gets the Business"



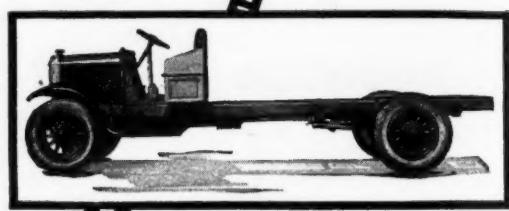
**Speed Truck Model 9**

*A fleet and powerful haulage unit specially designed to withstand the gruelling grind of speed truck operation. 1500 to 2500 pounds payload capacity. A high-class chassis that includes many nationally known parts.*



**Model 14—1 1/2 Ton Capacity**

*The size that satisfactorily meets most haulage requirements. A specialized truck, on the units of which many buyers are thoroughly sold.*



**Model 25—2 1/2 Ton Capacity**

*This low-operating cost 2 1/2 ton job is everywhere conceded to be the finest specialized vehicle on the market. A big money-maker for Commerce dealers.*

## Sign Up With a Seasoned Truck Organization

The Commerce Dealer Franchise includes considerably more than an exceptional opportunity to make substantial profits.

It is also a pledge that your business, as it steadily increases, is yours to have and hold for a lifetime—for this company is in business to stay.

This is a *seasoned* organization—matured in merchandising experience, in fundamentals of righteous policy toward Commerce dealers, in financial integrity.

Commerce Trucks are not just another line of motor vehicles. They are the perfected develop-

ment of an organization of motor truck specialists with an experience of over twelve years.

Pneumatic tires, electric lighting and starting devices, the cast tank radiator with removable core, and other sound improvements, were first adopted by Commerce in the truck field. *This is a live as well as a seasoned organization.*

If you think you can qualify for a Commerce Franchise, tell us something about yourself.

*Write Now*

**COMMERCE MOTOR TRUCK CO., DETROIT, MICH.**



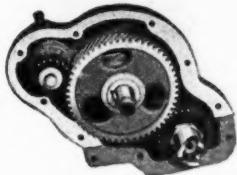


*"Let's see how my wife likes this car."*



#### To car owners

Your service station or repair man knows how to banish noise from the timing gear case. He can put Celoron Silent Timing Gears in your car. It isn't a long or expensive job. Then you will drive with comfort.



THE American woman has won equal rights in the family car. Interviews with thousands of car owners indicate that women often determine the make and body of car to be bought.

Women demand three qualities in a car—good appearance, ease of control, and silence in operation.

A quiet engine is a big selling point with the woman driver. Noise bothers her more than it does a man. She cannot endure the irritation caused by the knocks and taps, the grinds and howls that come from defective bearings, valves, and timing gears.

Manufacturers have developed the closed car with its luxurious upholstery and fittings particularly for women. They are tracing down all the noises that develop as a car grows older. They are eliminating noise at the source, where it is possible, by using improved crankshafts,

bearings, and timing mechanism.

All-metal timing gears will become noisy. Silent chains stretch, with wear, until the motor is out of time. Then a long and expensive tear-down, and a new chain must be installed.

Celoron Silent Timing Gears never develop grinds or howls. They are resilient, cushioning shocks and reducing wear on steel mating gears. They retain accurate timing. They remain silent.

Celoron Gears can be used in any timing train. They are standard equipment on quality cars in all price classes.

Yours may not be known as "a woman's" car. Quieting the motor will help to secure for your car the good opinion of sensitive women. We shall be glad to show you how Celoron Silent Timing Gears will help to keep your motor quiet. Drop us a line for complete information.

#### Diamond State Fibre Company

BRIDGEPORT

(near Philadelphia)

PENNSYLVANIA

Offices in Principal Cities

In Canada: Diamond State Fibre Company of Canada, Limited, 245 Carlaw Ave., Toronto

# CONDENSITE CELORON SILENT TIMING GEARS

Make Celoron Silent Timing Gears standard equipment on all your future cars



**D**AYTON WIRE WHEELS have proven their superiority in practically every dirt-track race during the past 18 months. The supreme test came in the 500 mile race at Indianapolis on May 30. The story is told in the following

**TELEGRAM FROM INDIANAPOLIS**

**Dayton Wire Wheel Co.,** May 31, 1923.  
Dayton, Ohio.

L. L. Corum driving special Fronty Ford wins 5th. place defeating 19 other cars in 11th. international 500 mile Indianapolis race May 30, 1923, at 82.58 miles per hour finishing with perfect running motor and making 2 pit stops for gas, oil and water only. No change of tires or wheels. This car used Dayton Wire Wheels.

**Chevrolet Bros. Mfg. Co.**

In the same race Frank Elliott driving a Durant special equipped with Dayton Wire Wheels won 6th place.

*Dayton Wire Wheels are built to stand up under the hardest kind of service. Longer tire life is the natural result of their light weight—their resiliency saves both car and motor.*

We are prepared to furnish wire wheels with the new 20-inch base rim, taking the new so-called "balloon" tire.

For Ford cars we are furnishing a special combination set of wheels with straight side rims and 28x4 cord tires.

*Write or wire us for our distributor proposition.*

**The Dayton Wire Wheel Co., Dayton, Ohio**

**Dayton**  
Wire Wheels  
QUICK DETACHABLE

## TOURING EQUIPMENT

WHEN your customers are stocking up for their summer trips—take a few minutes to display and demonstrate

## ARROW GRIP MOTOR NECESSITIES



### ARROW GRIP CHAINS

*for Pneumatic Tires*

They'll need them when summer showers make roads "greasy"; when they strike a patch of fresh oil or a detour on a slimy, clayey, country by-way. The handy Fasteners make attachment and replacement easy.

### ARROW GRIP JACK

*Handle Controlled*

Sells easily because it takes the irritation out of road mishaps. Raises the load quickly with a few easy turns of the long extension handle. Operated from a standing position. Keeps hands and clothing clean. Two sizes fit all cars and trucks. Packs away in small space.



*Show them to motorists—they'll buy without urging.*

**Ask Your Jobber  
or Write for Literature**

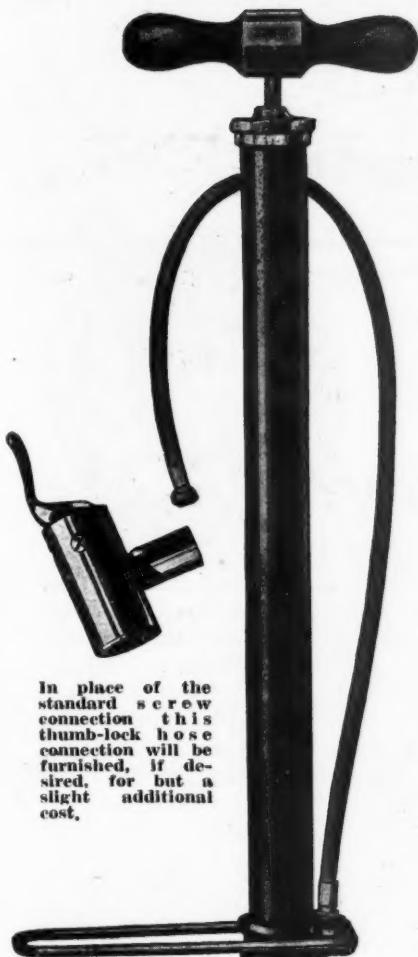
### ARROW GRIP MFG. CO., Inc.

106-126 Cooper St.  
GLENS FALLS, N. Y.

Export Office: 280 Broadway, New York

—<ARROW GRIP>—

Reg. U. S. Pat. Off.



In place of the standard screw connection this thumb-lock hose connection will be furnished, if desired, for but a slight additional cost.



Because of the patented MONROE Self-Oiling Washer MONROE valve leathers never become hard and brittle as is so commonly the case with other tire pumps. On every down-stroke of the plunger the leather, being soft, is evenly forced against the inner surface of the barrel, forming a positive, air-tight seal. Maximum compression is always assured.



## This Pump Has Them Both!

There are just two things that sell tire pumps and keep them sold—*low cost*—and *certainty of unfailing service*.

Both are incorporated in MONROE Self-Oiling Tire Pumps.

Priced low enough to make an immediate appeal to every prospective pump purchaser.

Certain in service because of the *patented* MONROE Self-Oiling Washer, which keeps MONROE valve leathers constantly soft and pliant. Other pumps, having no permanent means of lubricating valve leathers, have a tendency to dry out—lose compression—fail their purpose when called into service—a direct reflection upon the dealer who sells them.

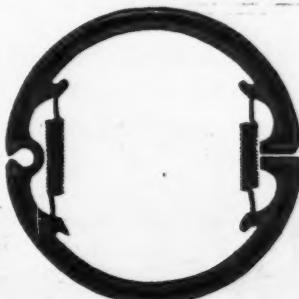
Think of this when next you order tire pumps—and specify MONROE SELF OILERS. Quick selling, they bring in a substantial profit with every sale—and stand back of your reputation as a square, responsible dealer.

*Full particulars and prices gladly sent upon request*

Monroe Auto Equipment Manufacturing Co.  
Monroe

Sales Representative to Jobbers Only  
The Fulton Company

Milwaukee, Wis.



Practically all of the hundreds of dealers, who sell MONROE SELF OILERS, also handle these two fast-selling specialties—the MONROE Closed Car Spotlight Bracket—and the MONROE Brake Shoe for Fords. Profit-makers, both. Ask about them.



## Tows 7000-lb. Limousine Up Mountain

It is conceded by autoists that Crawford Notch, the famous beauty spot of the White Mountains, is one of the severest tests encountered by tourists through New England. Mr. Robert Miller, of St. Louis, recently played good Samaritan to another tourist at Crawford Notch, thanks to Basline Autowline.

From the top of the Notch, Mr. Miller watched his chauffeur tow a disabled limousine from the very foot clear to the top, and then a half-mile beyond to the Crawford House garage.

Mr. Miller says: "I judge that the limousine my chauffeur towed weighed 7000 lbs. or more. This is certainly a sufficient test for 'Basline Autowline.' My chauffeur has since put the same line to severe tests in towing other cars, which would indicate that the line was not hurt by its first severe test."

**BASLINE AUTOWLINE**, the "Little Steel Rope with the Big Pull," is made of famous Yellow Strand Wire Rope. You can depend on it to pull you out of trouble every time. Fits under seat cushion.

### Money for Jobbers and Dealers:

**Basline Autowline** pays you a good profit, it sells well, and is the **ONLY** Nationally-Advertised tow-line on the market. Push it this season.

**BRODERICK & BASCOM ROPE CO.**  
ST. LOUIS — NEW YORK



G R 193



### You Can Get a Majority of the Timer Business

Hundreds of dealers are rapidly finding that the Bell Timer is making a reputation for them among Ford owners by selecting and selling such a sensible sturdy timer. There is nothing "freaky" or "tricky" about the Bell Timer—a feature which appeals to all Ford owners. The shell of the Bell Timer is made of Bakelite which makes it waterproof, oilproof and insures perfect insulation.

Bell Timers give the one thing that's been wanted for a long time for Ford Timers; perfect electrical contact, permanently maintained.

The self-adjusting copper brush does it. The construction is such that it must maintain an even pressure against the raceway—compensating for all irregularities of cam shaft motion.

An accurately timed, economically operated motor is assured.

Dealers like to handle the Bell Timer because it is becoming more and more popular—it sells fast and stays sold. The price is right. So is the discount.

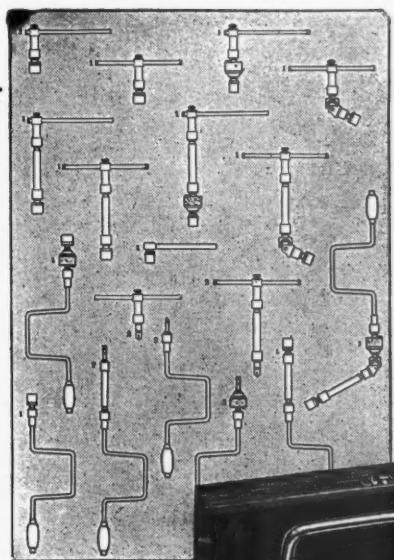
List price \$3.00.

**BELL MANUFACTURING COMPANY**  
BOSTON, MASS.



Dealers who order 10 or more Bell Timers are allotted this particularly striking display stand — enabling patrons to inspect Bell construction, showing them the wiping motion of the rotor brush on the raceway contacts and permitting close examination of the other features.

**The BELL Timer**



1—Ten of these  
2—Two of these

**H & G**  
Universal Set complete with Speed Wrench

# 140 combinations all in this ONE set

*Mechanic's Dream Comes True*

THE H & G Universal Socket Set complete with Speed Wrench takes the place of a wheelbarrow full of single-purpose tools.

In this set you have everything you need in the way of a wrench. You take it with you from car to car. No time is wasted trying to find the proper wrench.

The application is rapid and natural. The nut to be loosened or tightened determines the socket to be used, which is done at a glance. Its location determines what attachments are required, and they are instantly snapped on and the job is done.

Easy, simple, quick, practical—the better way.

\* \* \*

The Sockets, which are the heart of any set, are stronger, and permit the mechanic to use his strength. They are cold-drawn from bar stock by the Allen Process and are specially heat-treated. Just the right thickness to combine proper margin of safety in strength and still be thin enough to be used everywhere.

Superior in design, strength and workmanship, this set of wrenches will save your time and temper because it is a real tool for real mechanics.

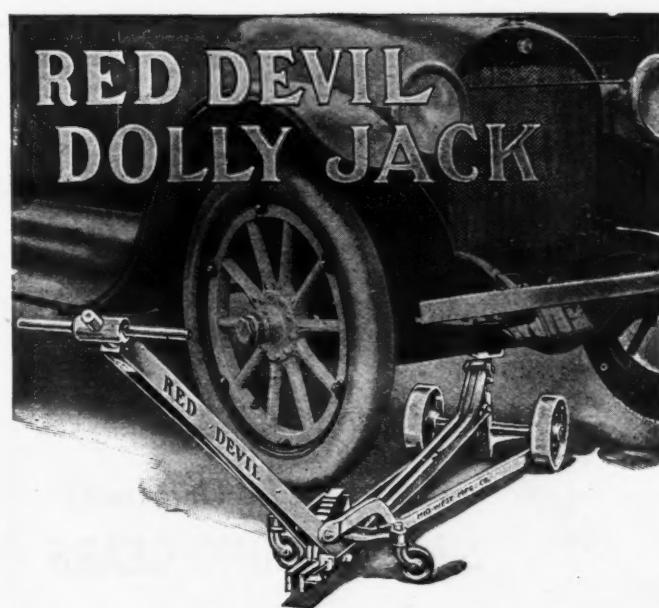
Ask your dealer. Write for literature.

**The Eastern Machine Screw Corporation**  
10-20 Barclay St., New Haven, Conn.

Socket

**H & G**

Wrench



## "The Standard Jack of the World"

More than 50,000 Red Devil Dolly Jacks are now in use and every one is making money for its owner by saving time and making work easier. Every garage needs one of these jacks.

A Red Devil Dolly Jack does in one swing what often requires ten shifts to accomplish otherwise. It moves cars around quickly in close quarters. Can be used under running boards, bumpers, tire carriers and other points impossible for the ordinary jack.

Strong and sturdy—all working parts of steel. One stroke raises or lowers car. Automatically locks in position. ITS AVERAGE YEARLY REPAIR COST IS ONLY 8c PER JACK.

Your jobber can supply you at \$30—see him.

**Mid-West Manufacturing Co.**

Minneapolis, Minn.

### Specifications

Range of adjustment	8 to 14½ in.
Diameter of wheels	8½ in.
Tread, 2 in., width of track, o.s.	15 in.
Length of truck	54 in.
Distance between wheels	13 in.
Capacity	6000 lbs.
Shipping weight	116 lbs.



*"Takes Rage out of Garage"*



## It Couldn't Be "Blind Luck"— Could It?

### Avoid Imitations and Substitutes

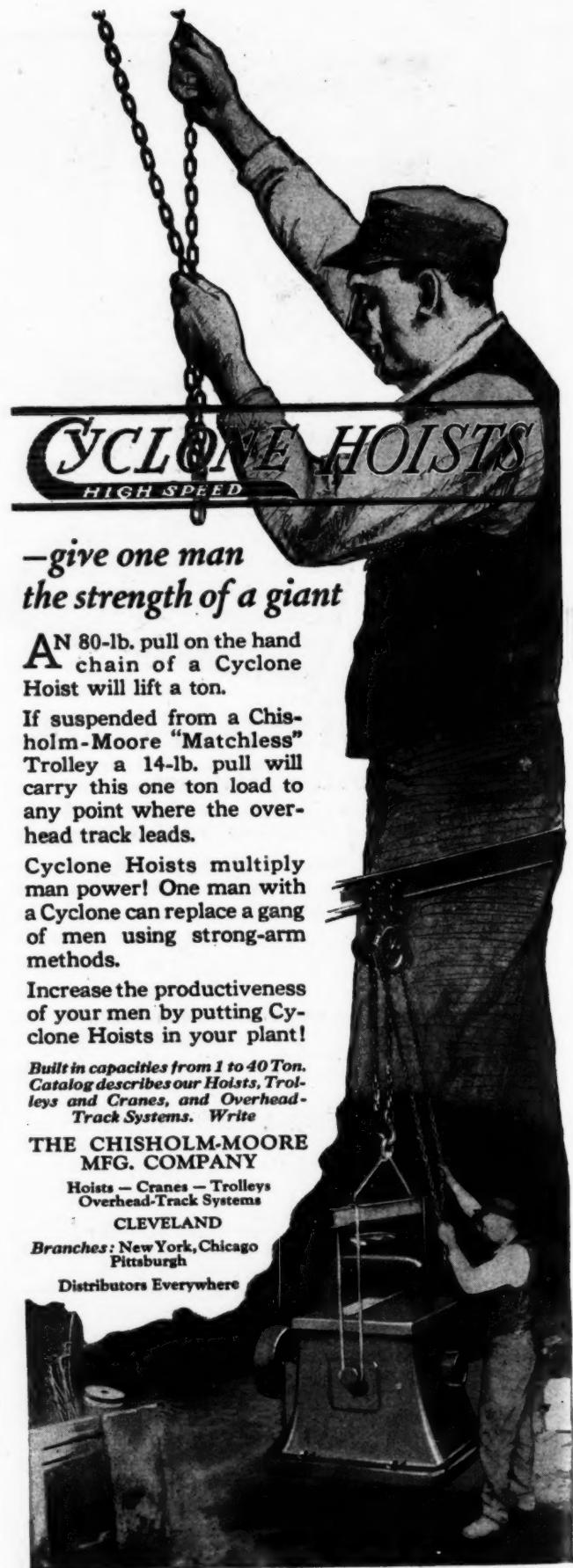
Pick out any leader in the automotive industry and analyze the underlying reasons for success. Invariably you will find three things—a product that is right, business methods above criticism and a high type of service. We hear a lot about "luck" but it doesn't stand one chance in a million with the real factors that make success.

It's simple enough, then, to figure out why D. & B. Silent Timing Gears have been accorded the place of leadership in the automotive trade. They have earned it. Like all other leaders, "luck" played no part in the rise to success. They occupy their present position because they deserve it.

Over one hundred jobbers stock genuine D. & B. Silent Timing Gears. Write to us for a complete price list and the name of the jobber nearest you.

**DALTON & BALCH**  
2333 Michigan Blvd., Chicago, Illinois  
Incorporated

Member of American Gear Manufacturers' Association



**AN 80-lb. pull on the hand chain of a Cyclone Hoist will lift a ton.**

If suspended from a Chisholm-Moore "Matchless" Trolley a 14-lb. pull will carry this one ton load to any point where the overhead track leads.

Cyclone Hoists multiply man power! One man with a Cyclone can replace a gang of men using strong-arm methods.

Increase the productiveness of your men by putting Cyclone Hoists in your plant!

*Built in capacities from 1 to 40 Ton. Catalog describes our Hoists, Trolleys and Cranes, and Overhead-Track Systems. Write*

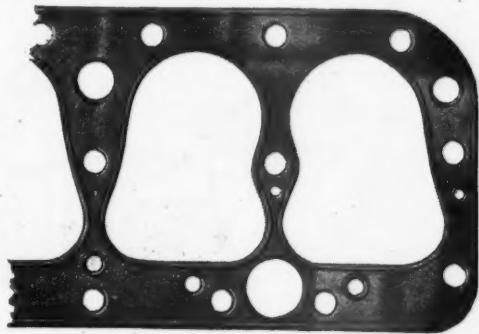
**THE CHISHOLM-MOORE MFG. COMPANY**

Hoists — Cranes — Trolleys  
Overhead-Track Systems

**CLEVELAND**

*Branches: New York, Chicago  
Pittsburgh*

*Distributors Everywhere*



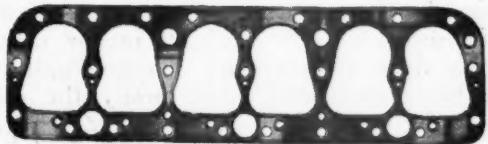
## The edge that binds

It's the bound edge and scalloped corners of a Never-Leak Gasket that binds the customer to you.

A job mechanically "right" may be "powerfully" wrong if finished off with a poor gasket.

Day by Day in every way the car owner is getting wiser and wiser. Please him and keep him. Give him good replacement parts and you won't have to replace a customer.

NEVER-LEAK Gaskets can't blow out. They retain their life. They last longer. They keep the customer sold. That's where your profit comes in.



There is a NEVER-LEAK Gasket for every standard make of car, truck and tractor. A sample will be sent on request. NEVER-LEAK catalog gives detailed description of gaskets used on various cars, trucks and tractors. Send for it.

THE FITZGERALD MFG. CO.  
Torrington, Conn.

# NEVER-LEAK Cylinder Head Gaskets



## For ALL Fords

No matter whether you drive an open car, a closed car, a delivery car or truck, or whether it is new or old, the very best investment you can make in it, is to install a Ford Faithful Oiling System. This is not an accessory or a frill but a piece of downright necessary equipment.

It overcomes all the shortcomings of the regular Ford System that allows the oil line to clog and so burn out bearings and score cylinders. The Ford Faithful assures 100 per cent Lubrication for motor always. This perfect lubrication means 50 per cent greater efficiency and longer life with the car a stranger to the repair shop.

*Order one from your dealer.*

### Ford Faithful Oiling System

Complete

**\$5.75**

**DEALERS**—Every Ford owner in your community is a live prospect for a Ford Faithful Oiling System. His car positively needs it. In supplying his needs you are not only making friends but also a worthwhile profit, with this excellent and satisfactory article. Write the factory **today**.

**W. O. Thompson Mfg. Co.**

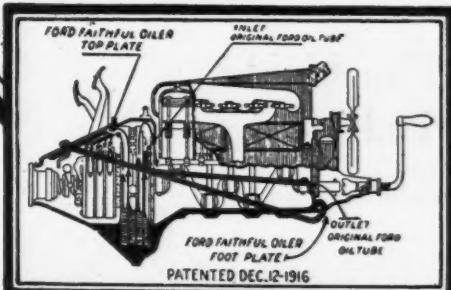
330 Mountain View St.

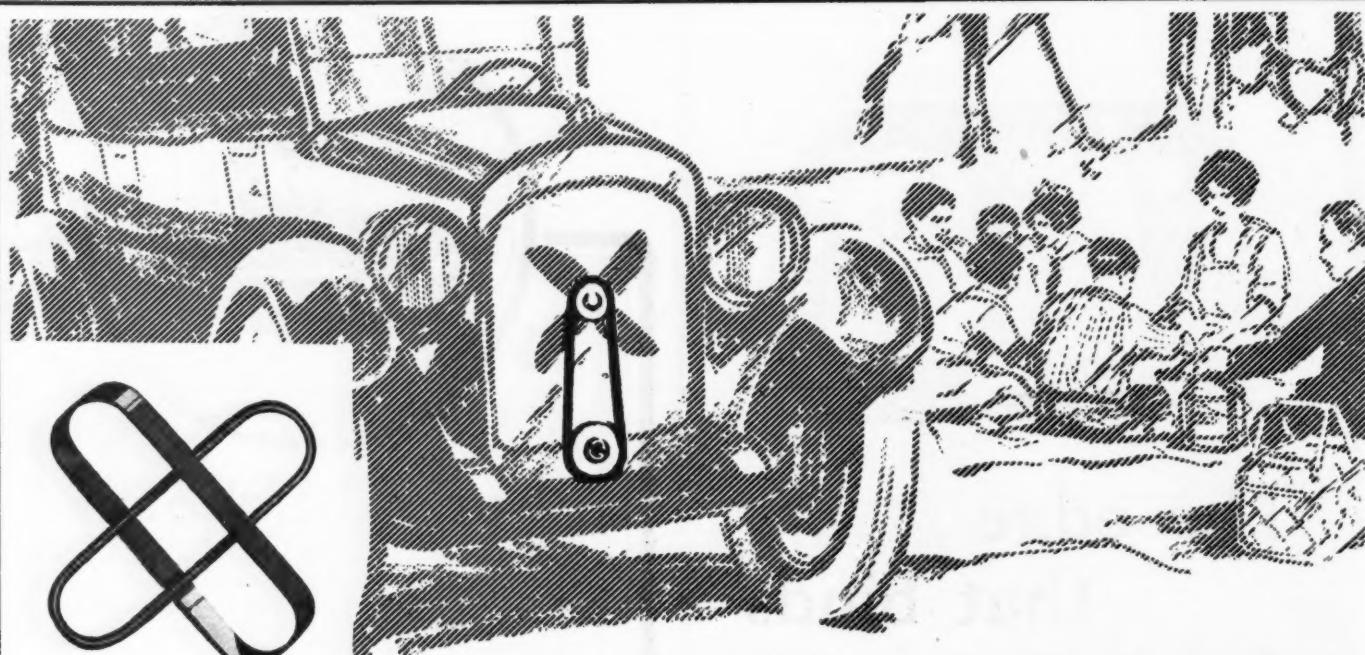
PASADENA

CALIFORNIA

*Ford Faithful patents are being upheld. Infringers will be prosecuted to the full extent of the law.*

# FORD FAITHFUL OILING SYSTEM





*Rie Nie*  
FAN BELTS

### The Fan Belt Everybody Likes

The popularity of Rie Nie Fan Belts is built solidly behind their reputation to outlast all other makes, their firm, sure grip that means a never overheated motor, their dependable performance that lets the owner forget he has a fan belt on his car.

Ask your jobber, or write direct. Rie Nie Fan Belt Chart sent on request.

Whether Vee-Round or Flat, Rie Nie Fan Belts are preferred everywhere. Dealers choose them also, not alone because they sell and satisfy, but because a smaller stock supplies all fan belt calls. That means less investment, quicker turnover, better profits.

**DURKEE-ATWOOD CO**  
MINNEAPOLIS, MINN., U. S. A.

## Repairmen and Motor Owners Unanimously for the HEALD

THE REPAIRMEN choose the Heald for its economy in producing the highest grade of work. The Heald Universal Jig permits quick set-ups and accurate location of the cylinder bloc regardless of size or type. Simplicity of control eliminates lost motion and accurately graduated dials supplant guesswork. Every factor for cutting time from floor to floor is incorporated in the design and the minutes saved on every bloc show in dollars in the day's profits.

THE CAR OWNER demands Heald regrinding because of its efficiency and economy. A Heald-ground cylinder is as perfect as mechanical means can make it. 90% of all motor manufacturers finish their cylinders by grinding and use Heald machines exclusively. Naturally the owners will want the same grade of finish when regrinding in order to maintain the high standard of their power plant.

*If you are considering this work, visit several regrinding shops, get in touch with the manufacturers themselves, and finally question various motor owners as to what equipment they advise to handle this work so as to bring you ultimate success. Let us send you convincing literature or even give you a personal call. No obligation. Glad to do it.*

**The Heald  
Machine Co.**



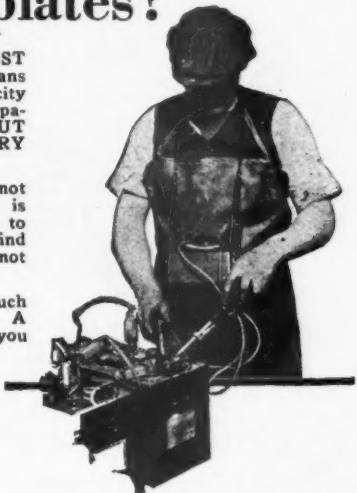
**61 New Bond St.  
Worcester, Mass.**

## Is this your way of finding defective battery plates?

It's the CADMIUM TEST—the only positive means of determining the capacity and condition of the separate plates—WITHOUT TAKING THE BATTERY APART.

When the battery does not come up to charge, it is usual for the mechanic to open the entire cell to find the plates which are not functioning properly.

And the result is much wasted time and effort. A losing proposition which you can't afford.



The Hoyt Cadmium Meter, together with the special Hoyt Prods, furnish the complete equipment for making this important test.

### THE BURTON-ROGERS COMPANY

Sales Department

Hoyt Electrical Instruments

755 Boylston Street, Boston, Mass.

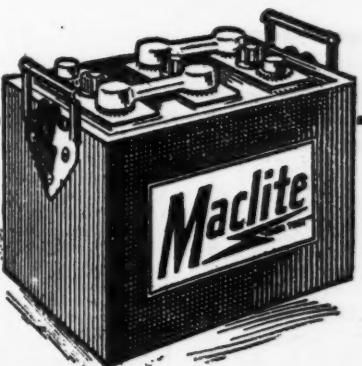
Branch Offices and Distributors in all principal cities.



Hoyt  
Instruments  
May  
Be Purchased  
From Your  
Jobber.

Send for your copy of  
"The Cadmium Test"—  
a booklet giving the Garage  
and Battery Man some highly instructive  
information on battery  
maintenance and repair.  
Simply enclose ten cents  
to cover postage.

"The Best-Equipped Shop  
Gets the Business"



## A healthy battery for live dealers

MACLITE is a thorobred—clear thru! You can sell it with enthusiasm!

All tests prove it a longer-life battery and more free from mechanical troubles.

There are excellent reasons for the high power and long service back of the Maclite Storage Battery.

Battery Plates are tough but extremely porous. Inverted bars in grid prevent shedding. Genuine Port Orford Cedar Separators—electrically treated by NEW process—give perfect insulation and freedom from chemical action. Non-Sulphating Plates. Plates are formed clear thru—no dead material. Quality guarantee!

There's a chance now to get the exclusive agency in YOUR territory. Full details on request. Write or wire now!

**Maclite Storage Battery Co.**  
Boston, Mass.

Materials laboratory  
tested—hand pasted  
plates—Expert as-  
sembly—Full bat-  
tery charge—Care-  
ful testing.

Send for  
free booklet  
describing  
the Maclite  
process.





# ALLEN (Bay State) WRENCH SETS



with Allen-Process Sockets  
— Guaranteed Unbreakable

At left: Box Set No. 19, with 9 hex. and 3 square sockets; reversible ratchet or solid wrench; universal joint; long and short extension bars; offset wrench. Price, \$10.00 (list).

At right: Bag Set No. 21-1, with 8 hex. sockets; reversible ratchet wrench; universal joint; extension bar; bent bar; removable adapter; strong, serviceable bag. Price, \$7.00 (list).



Besides the cold-drawn, unbreakable sockets there are other features distinctively ALLEN — any one of which might well make these wrenches your favorites. Their neat, compact design; their great durability of parts; their adaptability to as many as 129 different positions to a set: — these things combined with unbreakable sockets do make an unbeatable combination!

Box Sets and Bag Sets, made up to cover the maximum of wrench requirements with a minimum of tools. All described in the "Bay State" (ALLEN) booklet; copy sent if you'll send a word.

**THE ALLEN MFG. COMPANY** 135 Sheldon Street,  
HARTFORD, CONN.

Pacific Coast Branch Office: The Charles A. Dowd Sales Co., 320 Market Street, San Francisco, Cal.

Chicago Distributor: J. V. McDowell, 6230 Ellis Avenue.

Southern Distributor: The Johnson Sales Co., 1429 Candler Bldg., Atlanta, Ga.

15 FEET OF I BEAM TRACK

**Here it is**  
**Just the Thing for**  
**Your Shop**

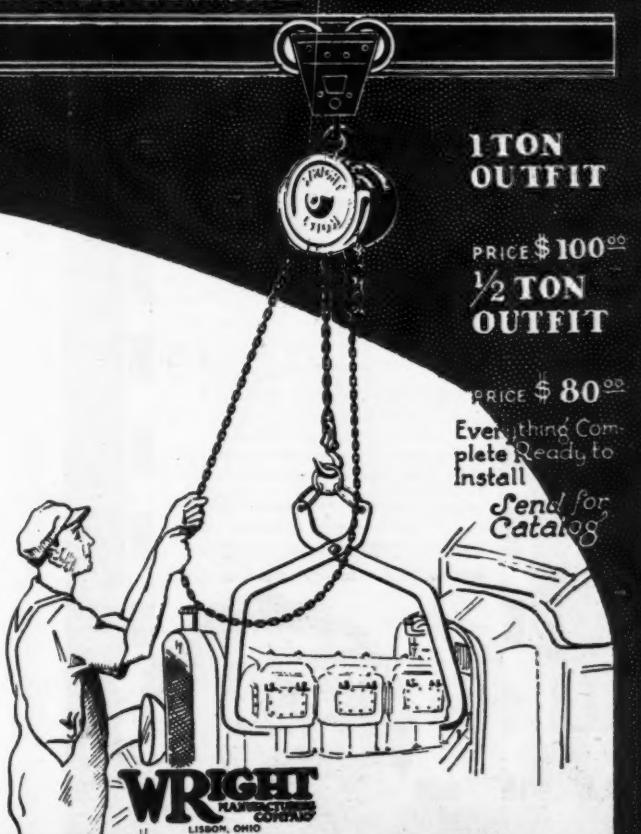
**DON'T —**

Don't Fuss & Worry with Blocking up a Car  
Don't Work Down in a Damp Pit  
Don't Take Time to lift and  
Then move the Car

**Hook her to a**

**WRIGHT**

**HIGH SPEED**  
**HOISTING & CONVEYING OUTFIT**



**1 TON**  
**OUTFIT**

PRICE \$100.00

**1/2 TON**  
**OUTFIT**

PRICE \$ 80.00

Everything Com-  
plete Ready to  
Install

*Send for  
Catalog*

**WRIGHT**  
MANUFACTURING COMPANY  
LISBON, OHIO

# Stafford's AUTO PRODUCTS



## Stafford's Cleaning Fluid

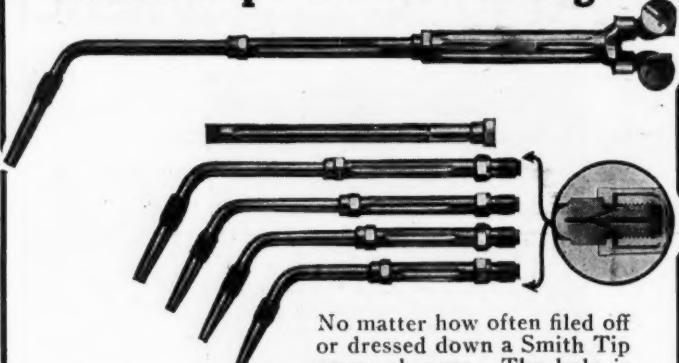
restores the freshness of cloth upholstery, removing spots and stains and bringing back the original colors. It will not burn or explode. Equally good for many household cleaning purposes.

Write for full particulars  
about the Stafford Line

Backed by a reputation of 65 years' standing, the Stafford Line includes these fast-selling products:  
 Renol, the Creamy Polish      Carbon Remover  
 Penetrating Graphite Oil      Gasket Cement  
 Radiator Stop Leak      Gasket Shellac  
 Black Liquid Tire Cover      Metal Polish  
 Auto Cushion and Top      Neatsfoot Oil  
 Dressing      Rapid Tar Remover  
 Generator and Magneto Oil      Rapid Repair and  
 Engine Enamel

S. S. Stafford, Inc., 603 Washington St., N. Y.

## Smith Tips Never Change



No matter how often filed off or dressed down a Smith Tip never changes. The hole is bored, not cast, and is of exactly the same diameter throughout. The size of the flame is therefore always the same.

There is no explosion chamber in a Smith Welding Tip. A Smith Tip does not splatter hot metal on the welder. The mixing chamber extends from mixing nozzle to tip, eliminating gas pockets, popping and back firing.

Only pure, heavy all-copper bars (not composition) are bored to make Smith Tips. That is why they cool best and last longest. Send for our booklet: "The Latest Word in Torches."

**SMITH'S  
INVENTIONS  
INCORPORATED**

MINNEAPOLIS

Exclusive Manufacturers of  
Welding & Cutting Equipment

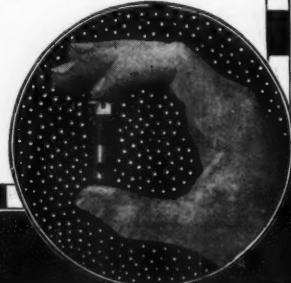
## KING QUALITY PISTON PINS

Do you know how big your market is? Write for our booklet on "The Potential Market for Replacement Piston Pins." It applies not only to piston pins but to other lines as well. It will help your sales.

PISTON PINS  
PISTON PIN SET SCREWS  
STEERING KNUCKLE  
BOLTS and BUSHINGS

All King Quality Products conform to  
the same standard of excellence

Automotive Division  
KING SEWING MACHINE CO.  
Buffalo, N.Y. Bridgeburg, Ont., Can.



DE LUXE  
Products

An unassuming pump,  
to be sure. But when  
it comes to action—

*O Man!*

ORDER DIRECT  
SPECIFYING  
JOBBER

*The*  
**DeLuxe**  
TIRE PUMP

Also  
ARVIN HEATERS  
DE LUXE,  
DE LUXE VENTILATORS  
INDIANAPOLIS PUMP & TUBE CO.  
INDIANAPOLIS



*Campbell*  
Advertising  
Tire Covers

Campbell Advertising Tire Covers will carry your sales message day after day at eye-level over miles of the city's principal streets and over country roads or wherever a car may be, creating invaluable publicity at a remarkably low cost.

The motorist is proud to use Campbell Covers, because they fit, and improve the appearance of his car.

The trade-mark or slogan designs are dignified and in good taste. They do not create that undesirable "sign-board effect" but are proven evidences of the motorist's pride in his car or in its equipment.

**The Perkins-Campbell Company**  
622 Broadway, Cincinnati, Ohio  
New York Chicago  
Mfrs. of Seat Covers and Textile Products

Most Complete Line  
Manufactured in the  
United States

Dependable  
Reamers

SPIRAL FLUTE

TWIST DRILL

TAP

SPECIAL TOOLS FOR EVERY MAKE OF CAR

**Moore & Moore, Inc.**  
Reading, Pa.

## 10 Big Selling Points



**CIRCLE "S"**  
AUTOMATIC  
WINDSHIELD CLEANER



List  
Price

**\$5.00**

When a Motorist installs a Circle "S" he tells his friends about it.

*"One Sells Another"*

If an article bests competition by just one point it takes the lead in sales—It is not by one but 10 big exclusive features that has put the Circle "S" foremost in the sale of automatic windshield cleaners—Big sales mean easy sales.

Dealers and Jobbers—Write us today  
for details and discounts

**F. W. STEWART MFG. CORP.**  
356 W. Huron Street Chicago, Illinois  
Manufacturers of the well known Circle "S" Speedometer Swivel Joints



### SOMETHING GOOD ABOUT BAD ROADS

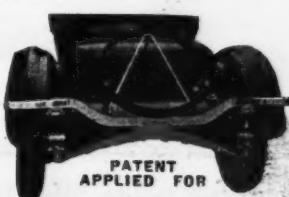
**A & B PLATFORM SPRINGS**  
Provide Greater Comfort  
FOR DODGE CARS

Rough Oil Field Roads Have Necessitated the Development  
of Special Springs

This spring has stood the severest  
tests. Thousands now in use.

*Write for Catalogue*

**A & B SPRING MFG. CO.**  
Oklahoma City,  
Oklahoma



PATENT  
APPLIED FOR



PRICE  
**\$1 40**

**Sells on Sight!**

A DUSTER that saves time for every car owner. Made of tan cotton, chemically treated. A japanned handle that can't loosen.

Pointed spoke brush for cleaning wheels (wood, wire or disc). Price \$1.10.

Auto washer spray brush for washing cars. Price \$3.70. All brushes guaranteed. Liberal discounts quoted on request.

The Superior Brush Co., Inc.  
147 Temple Street,  
Hartford, Conn.



Retail Price, only 30c each  
up to 3-8 in. wide or 5 in. diam. Larger,  
50c. Order just like piston rings.

Dealers: Find your jobber in the list.  
If not there, send us his name today.

Jobbers: Write today—find out why  
scores of big jobbers count this one of  
the six best sellers.

**GENUINE**  
**APEX INNERINGS**  
(INSIDE PISTON RINGS)

QUALITY of DISTRIBUTION behind Genuine APEX INNERINGS and its sweeping extent prove the deep-rooted success of the article to

**STOP OIL PUMPING—PISTON SLAP**

Fully protected by the manufacturers rigid guarantee, the trade knows and hundreds of thousands of car drivers, fleet owners, gas engine owners and operators of every class know that there is only one genuine and successful Innering on the market, fully patented in the U. S. and Canada, that will bring back power, silence and economy of operation. Dealers, garage and repair men everywhere know these things and know how Genuine Apex Innerings stop oil pumping, piston slap and excessive carbon without costly reborning. See your dealer today! He knows Genuine APEX INNERINGS!

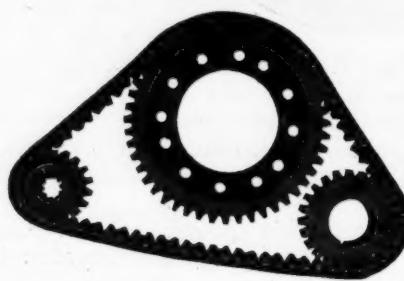


Thomson-Friedlob Mfg. Co., Peoria, Dept. C, Illinois

# "WHITNEY"

LONG SERVICE **CHAINS** HIGH MILEAGE  
SILENT TYPE

Never Skip the Sprocket Teeth

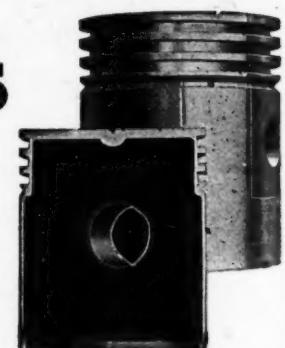
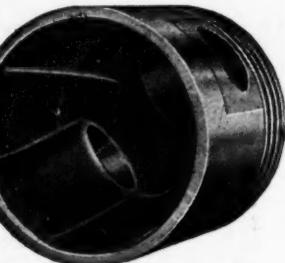


Unrivaled for Great Mileage

## THE WHITNEY MFG. CO. HARTFORD, CONN.

New York      Boston      Philadelphia  
L. C. Biglow & Co., Inc.      George C. Steil,      R. J. Howison  
232 West 55th Street      200 Devonshire Street, 1361 Ridge Ave.  
San Francisco, A. H. Coates Co., 770 Mission St.

**A SERVICE STOCK**  
of  
**FOSTER**  
sensible lightweight  
**PISTONS**  
BRINGS  
the DISCRIMINATING  
TRADE



We can supply **FOSTER**  
Pistons for almost any  
make of car, truck and  
tractor.

A Jobber proposition that is liberal and well worthy of  
consideration is now ready. Get all the facts concerning  
this—they're ready to send to you.

**FOSTER-JOHNSON REAMER CO.**  
1060 Beardsley Ave., ELKHART, IND.

## The Ultimate Way WET INTERNAL GRINDING

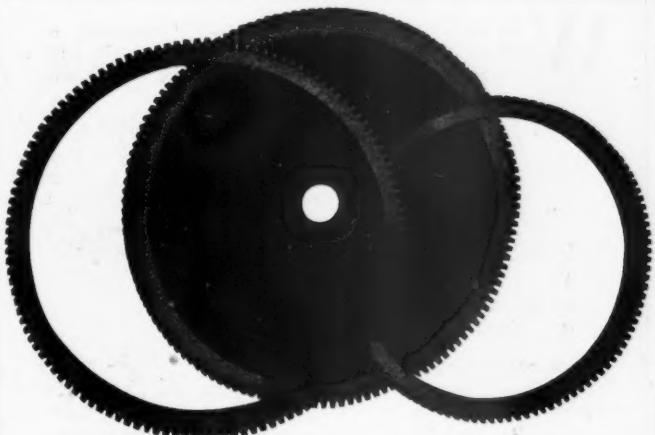
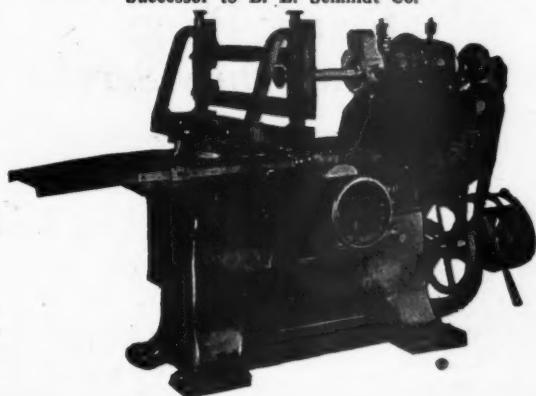
Wet grinding, as made possible by the Micro Internal Grinder is as far in advance of ordinary dry grinding as the present day automobile is over the old ox team.

# Micro

The Micro is a highly developed type of internal grinder adaptable for either wet or dry grinding, at the option of the operator, permitting highest quality of results. Its automatic action, both as to cut, feed and table travel provides the most accurate work humanly possible in exceptionally quick time.

If you're going to get a grinder, get the kind that will pay you biggest returns. Our bulletin gives full information—send for it.

**MICRO MACHINE COMPANY, Bettendorf, Iowa**  
Successor to B. L. Schmidt Co.



## New Low Prices On Fly Wheel Rings

Increased quantity production has enabled us to get out a new and lower price list on Meachem Steel Gear Rings for Fly Wheels. Also our trade discounts have been increased to more than offset the lower list prices. Write us for the new list and discounts.

**The Meachem Gear Corp'n.**  
Ring Dept. Syracuse, N. Y.



## Johnson Bushings Perform 100% in Duesenberg Record Run

Covering a distance equivalent to that from New York to Los Angeles, at an average speed or more than 60 miles per hour, maintained *without a stop* for almost 51 continuous hours, this Duesenberg Stock "Straight-Eight" established an endurance record which is almost without parallel.

Day and night, during that ceaseless grind, resisting the most grueling kind of punishment to which bronze bushings could be subjected, Johnson Standard Bushings performed 100 per cent. *Need we say more?*

Ask your jobber's salesmen for Johnson Standard Bronze Bushings, or write for stock list today.

**JOHNSON BRONZE COMPANY**  
New Castle, Pa.

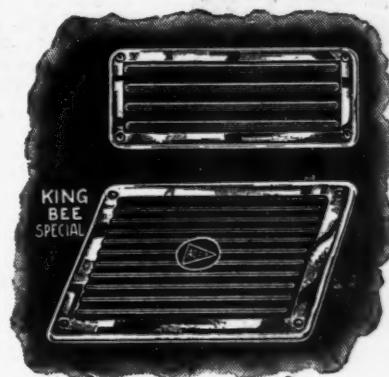
## JOHNSON BUSHINGS

## ELEGANT!

IS THE WORD THAT DESCRIBES THE

**KING BEE  
SPECIAL**

These plates will add to the appearance of any car because they are made of hard aluminum (not soft castings) and therefore will hold a beautiful mirror finish.



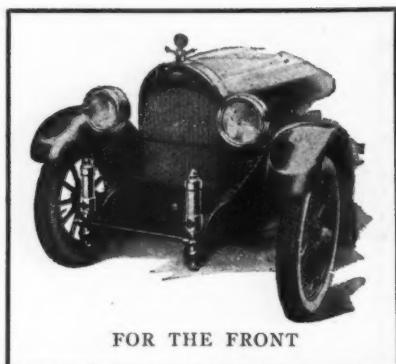
**RETAILS AT \$2.50 COMPLETE**

This includes plate, kick with both rubber mat inserts and necessary screws for attaching.

*Manufactured by*

**AMERICAN  
AUTOMATIC DEVICES CO.**  
502 So. Throop St. Chicago

Dealers: Ask your jobber for prices, or write us if you have any difficulty.



FOR THE FRONT

Model A for cars up to 3500 lbs.  
\$150

## Easily Installed

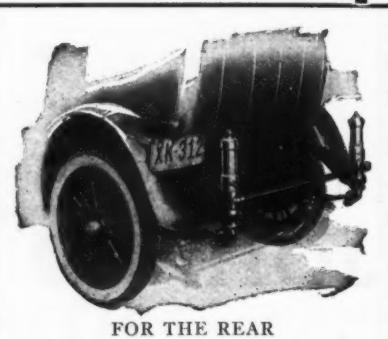
Simply remove horn from end of car frame and insert the Air Spring attachment. Three new rivets to set. Attached to spring by removing Shackle bolt and then replacing.

REID AIR SPRINGS  
FLOAT THE CAR ON AIR

Cars equipped with Reid Air Springs are permanently relieved from road jolts. The positive two-piston action cushions the bumps against Air pressure and Oil without causing instability.

Attractive profits for live dealers and distributors. Get full details now.

The Reid Air Spring Co.  
New Haven, Conn.



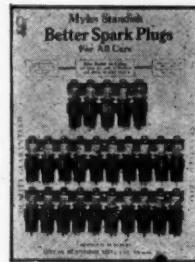
FOR THE REAR



All plugs and cores equipped with improved gas-tight gaskets



Also equipped with special non-burning electrodes

MYLES STANDISH Conical  
Spark Plugs  
For Heavy Duty Service

Attractive display boards help make sales.

For the high speed, high compression engine experience has proven that the Conical Insulator is the satisfactory type. Myles Standish Conical plugs are built with removable cores and can be cleaned easily and satisfactorily.

MYLES STANDISH MFG.  
COMPANY

419 S. 12th St. Omaha, Neb.

AUTO-HONE  
Pulls Customers

A dealer with a sign across his building, which reads: "Honed Cylinders Are Better," is pulling in business to the tune of seven engine blocks a day, on an average. This dealer is making a profit on this class of work of over \$80.00 each day. We get the same story from all sections of the country—a story of profits, honing cylinders.

## You can do the same

Auto-Hones are made in two sizes:  
For cylinder 2-13/16 to 3-1/8 bore..... \$85.00  
For cylinder 3-1/8 to 4-1/2 bore..... 95.00

A complete illustrated direction sheet accompanies each tool which enables you to do perfect work right from the start. Don't overlook this opportunity. Send your order in or write for information today.

THE AUTO-HONE CO.  
GENERAL OFFICES 1587 MAIN STREET  
INCORPORATED 1911  
BUFFALO, N.Y., U.S.A.



WHEN ALL advertisers demand their money's worth, all publications will provide circulation reports verified by the Audit Bureau of Circulations.

It is one of the mysteries of the advertising world that while all manufacturers demand verification of weight and quality in the material purchased, some of them still buy advertising space without knowing what they are paying for.

Such advertisers, however, are now exceptional. Most of them demand verified A. B. C. circulation statements before placing contracts.

In the case of MOTOR AGE, the demand is immediately met.

It is a member of the Audit Bureau of Circulations.

BLACK & DECKER  
QUARTER INCH DRILL

\$28.00

"With the Pistol Grip and Trigger Switch"

THE BLACK & DECKER MFG. CO.  
Towson, Md.



**EAGLE**  
ALIGNING FIXTURE

The Eagle Universal Aligning Fixture Helps Repairmen turn out the **BEST** overhauling jobs.

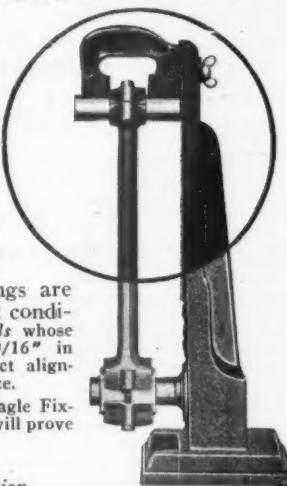
The Eagle Aligning Fixture is the *most complete* and *only* Universal fixture on the market. It meets every requirement in accurately aligning wrist pins, bushings, connecting rods and pistons.

Take, for instance, the proving of a connecting rod. You know that rod bearings are *never* the same size, even on the same crank-shaft. So an ordinary, round type bushing will not fit all rod bearings to make the rod set perfect for alignment.

The Eagle Patented Bushings are constructed to overcome that condition. Eagle Bushings fit *all rods* whose bearings are from  $1\frac{1}{2}$ " to  $2\frac{9}{16}$ " in diameter—thus allowing a perfect alignment of rods of any length or size.

This is just *one feature* of the Eagle Fixture—there are many more that will prove a real asset to your shop work.

See your Jobber or  
Write us for full information



**EAGLE MACHINE CO.**

Indianapolis 24 N. Noble St. Indiana

Indianapolis 24 N. Noble St. Indiana



**Oiling System for Fords**

**Distributors—**

**You Have  
500 to 800 Chances**

to make a good profit with little work, in any county in your territory. The number depends on where you are. Let us know your state, and we can tell you very nearly what you should be able to make this summer, selling YALE Oiling Systems. The right methods could easily make \$5,000 for you, and leave a lot more to get.

A YALE Oiling System can be attached to a Ford in a few minutes, and that Ford will run longer, smoother, cheaper because of it. The YALE sends plenty of oil to all moving parts even if the regular oiling system is clogged. (The YALE can't be clogged by lint.) Going uphill, the YALE increases the supply of oil.

*Write us for advice  
and help in selling them.*

**ROLAND & KOCH**

411 S. Main St. 2715 N. Broad St.  
Los Angeles, Cal. Philadelphia, Pa.

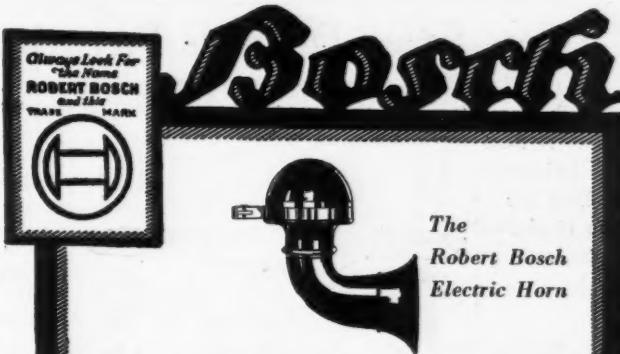


**Built Like You'd Build 'em Yourself**

**Y**OU'D build bearings Right, that's certain. No one knows better than you the importance of rugged precision in a bearing. They'd fit—so you wouldn't have to scrape away ALL your profit putting 'em in. They'd stand up—so you wouldn't have to hand out alibis to your customers for things that weren't your fault. In short, they'd be bearings like Milwaukees, because that's how WE make 'em! Ten times micrometer tested! Virgin metal! Perfect! And don't forget—Milwaukee Bearings are always "in stock, not over a day away"! Write for FREE list of cars, trucks, tractors, with name of stock nearest YOU—

Milwaukee Die Casting Co., Milwaukee, Wis.

**MILWAUKEE BEARINGS**



**New and Profitable Sales**

Quality car owners are enthusiastic over this latest genuine, original Bosch Product. Be sure to capitalize at once on the constantly growing popularity of the

**Robert Bosch**

**Electric Horn**

*Send for Full Details*

**Robert Bosch Magneto Co., Inc.**  
Otto Heins, President

123 West 64th Street New York

Chicago Branch: 1302 South Wabash Ave.  
Several Hundred U. S. Service Stations—  
Representatives the World Over  
The Genuine, Original Bosch means Robert Bosch only.

## STAR BALL RETAINERS



For Thrust and Cup and Cone Bearings

THE BEARINGS COMPANY OF AMERICA  
LANCASTER, PENNA.

Detroit Office,  
1012 Ford Bldg.



## PARKER VISES SOLID UNDERPORTION

instead of hollow gives greater strength. Outside saddle and saddle screw permits taking up lost motion and easy removal of screw for lubrication.

Send for Feature Folder No. 9

The Charles Parker Co.,  
Master Vise Makers  
Meriden, Conn., U. S. A.



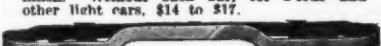
Parker Vises  
"Grip Like  
a Grizzly"

## New Era—Driver's Favorite

The Bumper  
That is Best  
for Drivers  
Is Best for  
the Dealer—  
It Sells  
Best.



New Duo-Convex Bumper with back bar reinforcement. Double convex spring bars with graceful steam lines. Black or full nickel. \$17 to \$24, according to size and finish. Without back bar, for Fords and other light cars, \$14 to \$17.



The New Duplex Sport Model. Most beautiful bumper on the market. Black japan or nickel. Medium cars, black, \$16.50, nickel \$18.50. Large cars, full nickel only, \$28.

## New Era Spring & Specialty Co.

SMALLEY DANIELS, President  
70 Cottage Grove St., Grand Rapids, Mich.  
Export Dept. 130 West 42nd St., New York City

It is  
Right, in  
Price  
Material  
Design  
Finish  
Guaranty  
Service.  
20 Styles  
Write for  
Catalog.

## PARANITE CABLE

Best for Automotive Work

We carry at all times a complete stock of every kind of cable used for automotive work. Many years of specialization have brought PARANITE Cables to the highest state of perfection. The finest grades of rubber compound, cotton and flexible enamel varnish are used.



FOR 33 YEARS THE STANDARD  
IF IT'S PARANITE IT'S RIGHT  
Quality jobbers handle quality cable—  
that's PARANITE.

Indiana Rubber & Insulated Wire Co.  
810 Marquette Bldg., Chicago  
Factory and General Offices—Jonesboro, Ind.

## All Sizes of Cylinders

Finished With One Storm Cylinder Head

Even biggest tractor cylinders up to eight inches in diameter. Without changing heads, parts, blades or hones, here is the ideal tool to resize all cylinders, or to polish after boring, grinding or reaming for that Storm "gun-barrel" finish so popular today.

Price

\$36.25

Capacity

2 1/4—8 in.

You can make more money with this head than any other tool or machine in your shop. Use it with electric drill or Storm Cylinder Finishing Machine—an automatic, motor powered machine for driving the Storm Head that eliminates all mechanician's time to operate.

Ask your jobber, or write for new Storm Book on Modern Cylinder Methods.



**STORM MFG CO.**

406-A Sixth Ave. So.

Minneapolis

## NO-LEAK-O PISTON RINGS

Won't Leak Because They're Sealed With Oil  
"NO-LEAK-O" Piston Rings are making money for dealers everywhere. Their "oilSEALing" groove—found only in No-Leak-O—packs an oil film in between piston and cylinder walls like "packing" in a pump. Oil and gas stay where they belong. National advertising is helping the dealer sell No-Leak-O by teaching the motorist the lesson of more mileage on less oil and gas.

It will pay you to stock No-Leak-O at once.  
Price 50c and up.

NO-LEAK-O PISTON RING CO., Dept. T-57, Muskegon, Mich.

## HAVE THEM RE-BABBITTED WATKINS RE-BABBETING SERVICE

Address Branch nearest you:  
Indianapolis, Indiana. Indianapolis, Indiana. Watkins Mfg. Co., 20 W. South St.; Syracuse, New York. Watkins Mfg. Company of N. Y., 202 Wyoming St.; Waterloo, Iowa. All States Re-babbitting Service, 2 Main St.; St. Louis. Mo., H. & H. Machine Co., 4274 Easton Ave.; Toledo, Ohio. Stewart-Burgan Company, 1946 Putnam Ave., Memphis, Tenn. J. B. Cook Auto & Mac. Co., 278 Washington Ave. Home Office: WATKINS MANUFACTURING CO., Wichita, Kansas

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Watch the classified advertising columns of MOTOR AGE and you'll see many of them. Often a man has goods for quick disposal and he announces the fact here. Whether or not you are in the market right now for certain things you will find it pays to look over the classified ads every time you receive your copy of the paper. It's a good habit to get into and some day you'll be mighty glad of it.

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READ THE CLASSIFIED ADS IN MOTOR AGE

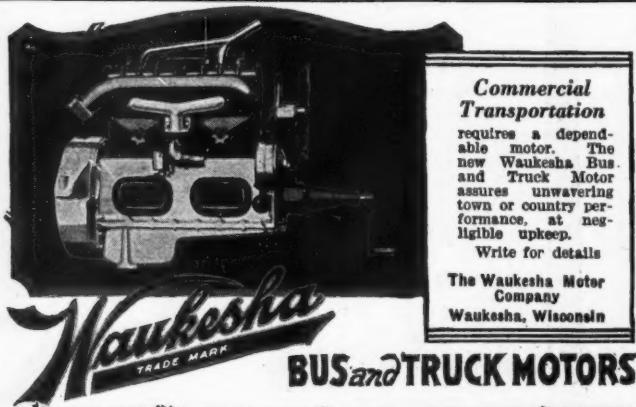
## TAKE THE END-PLAY OUT! —WITHOUT PULLING THE MOTOR



THE C. A. ADJUSTABLE CENTER BEARING CAP corrects Ford crankshaft end play and sets magneto for highest efficiency without removing the motor. Easily and quickly installed. Guaranteed for one year. Last price \$3.75. Ask your jobber or dealer or write us direct.

Pat'd 7-22-22

ADJUSTABLE BEARING CO., Inc.  
Dept. M. Brazil, Indiana



BUS and TRUCK MOTORS

Commercial  
Transportation  
requires a dependable  
motor. The new Waukesha Bus  
and Truck Motor assures unwavering  
town or country performance, at negligible  
upkeep.  
Write for details  
The Waukesha Motor  
Company  
Waukesha, Wisconsin

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SOCKET WRENCHES FOR PARTICULAR  
PARTS OF EACH PARTICULAR CAR**



For over sixty makes of cars and trucks in general use today, Walden-Worcester has Service Selections of Socket Wrenches—each selection especially adapted for particular parts of the particular car for which it is designed.

Your Jobber can supply you with any or all Selections from his stock. Write him.

**WALDEN-WORCESTER**

Incorporated

General Offices and Factory

Worcester, Mass.

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BENCH FURNACES  
REQUIRE NO FORCED  
AIR BLAST.**

For Soldering  
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Heat Treating



The most economical, quickest heating Bench Furnace for any shop.

Fitted with two Powerful Johnson Burners, which produce a heat of 2000° F. in the fire-box instantly.

Write for our descriptive circular of Gas Appliances.

**JOHNSON GAS APPLIANCE CO.**  
Cedar Rapids, Iowa

**The Garage  
Special**



**Electric Drill and  
Valve Grinder**

That saves every garage or repair shop time and money.

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Incorporated

Louisville, Ky., U. S. A.

C. E. Willey, Pres. J. B. McFerran, Secy-Treas.

It will do  
the work.

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ALUMINUM ALLOY. NON EXPANDING.



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Piston Slap is a common and vexatious cause of engine trouble which in the past has bothered most car owners.

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Let us tell you more about this remarkable piston. Write for the details today.

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Main Office and Factory

4834 Beaubein Street

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12,000,000 Passenger Car Owners

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BATTERY PLATES**

GENERAL plates last so long that even your hardest customer will admit he has had his money's worth. When the customer comes back he is ready to spend more money with you. He is satisfied.

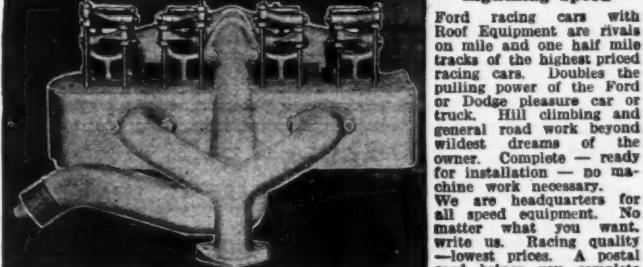
Don't you believe that these business-building plates are most profitable for you?

*Our introductory offer and our 90-day plan will interest you. Write for it.*

**GENERAL STORAGE BATTERY CO.**  
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**ROOF 16 OVERHEAD VALVE EQUIPMENT  
For Ford and Dodge Motors  
ROOF 8 VALVE HEAD FOR FORD MOTOR**

Stupendous Power—  
Lightning Speed



Jobbers—Dealers—Consumers—Write Us  
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**MCK**

Pat. Feb. 13, 1923

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Pittsburgh, Pa.Cyclo "Dynamic" Hot-Spot  
For Fords

25 to 30 miles per gallon is the rule rather than the exception among CYCLO users.

VACUUM HEAT-CONTROL insures plenty of power under all conditions.

Ask about our "Rapid Transit" selling plan

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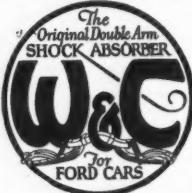
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Automatic Automobile  
SAFETY SIGNAL

Dealers Wanted—Send for Folder

AUTOMOTIVE DISTRIBUTING CORPORATION  
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Ball Bearings

## F-40 For Fords

and Chevrolets. A thrust bearing for the differential. Makes 'em push easier, climb better, dodge axle trouble.

Bantam Ball Bearing Co.,  
Bantam, Conn.SAY "W. & C."  
and Your Jobber Will Give You the  
Most Successful  
Time-Tried Shock Absorber for Fords  
W. & C. Shock Absorbers Sell  
P. H. WEBBER COMPANY  
Hooperston IllinoisJOBBERS  
Do not overlook these live selling and profitable items. The metal is brass, heavy nickel plated and will not rust.  
Four styles—one for every car. No. 503 with the Hump Base. No. 504 with Ell Base. No. 505 Plain Lock-Type. No. 506 Swivel Lock-Type.  
Packed fifty to a carton; five display cards of ten each.  
The company that took the rattle out of  
Anti-Rattlers

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and FRONTY-FORDS

Designed and built by the famous race drivers and engineers, Arthur and Louis Chevrolet. Write for FREE Illustrated Catalog. Book on "How to Build a Fronty-Ford," \$2. Given free with orders of \$50 or more.

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AUTOMOTIVE EQUIPMENT  
Cable  
Starting—Lighting—Braking  
Formerly M.P.

THE GOODRICH-LENHART MFG. CO., Hamburg, Pa.

IT'S EASY TO SELL  
"The only oil ring with a  
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The Sav-Oil Ring Mfg. Co.  
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Electrical Testing Equipment

Universal Test Benches, Growlers, Magnetizers, etc.  
Write today for Bulletin M-18

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ACCURATE DRILLINGWrite for circular, "A Jacobs Chuck  
for Every Purpose."THE JACOBS MANUFACTURING CO.  
Hartford, Conn.**FISK TIRES**There's a Fisk Tire of extra value in every size,  
for car, truck or speed wagon

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Standard equipment on 37  
of America's foremost  
cars and trucks.Pass I. E. S. rules and all  
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With the Wandering  
Oil Groovepronounced  
[WICK-A-CO]

WICACO

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Be the local Logan Man — Let us show you how easy and how profitable it is to install Logan Ring Gears.

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**LOGAN FLY WHEEL RING GEARS**

Distilled Water, one gallon per hour, 24 hours a day, with the

**CLEVELAND AUTOMATIC WATER STILL**  
Price, \$15.00

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Motor Wheel Corporation, Lansing, Michigan



Rello, an electric-drive wet grinder for pistons, pins, valves, bushings, \$475.00. Valvo, an electric-drive bench grinder for valves, valve-seat reamers, \$175. See page ads this paper.

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Springfield, Mass.

**Gill-Special-Servus**  
Piston Rings for Every Need

GILL MFG. CO., 8300 South Chicago Ave., Chicago

Automobile and Radio batteries charged for a nickel. Ten million car owners and five million radio fans are prospects for

**THE HOMCHARGER**  
BIG PROFITS. WRITE NOW.  
The Automatic Electrical Devices Co.  
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Auxiliary firing-chamber gives it the explosive power of a howitzer. Carburetor must be adjusted LEANER immediately. Overcomes oil self-cleaning.

Distributors wanted.

**NT SPARK PLUG**  
With the Explosive Spark  
THE T. N. T. SPARK PLUG CO.  
Cleveland, Ohio

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**CLARK AUTOMATIC DRILL**  
Just a Little Bit Ahead  
—with double pole automatic switch; maximum safety and efficiency assured.

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Indicates definitely direction driver intends to turn. Signals at both front and rear of open or closed cars. Meets requirements of all State laws. Attractive — Durable — Effective. Dealers — Jobbers, write for details and territory.

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SIGNALS RIGHT, LEFT, GO OR STOP  
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SIX  
"EVERLASTING PERFORMANCE"  
Engine Sealed and Guaranteed for 2 Years  
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The Replacement Spring  
JENKINS VULCAN SPRING CO.  
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BRANCHES: Boston, Mass., 819 Boylston St.; Dallas, Tex., 2216-18 Commerce St.; St. Louis, Mo., Main and Cedar Sts.; San Francisco, Cal., 1035 Polk St.

See the Beveled Edge and Oil Groove of the Universal One-Piece Piston Ring  
Forced Lubrication Prevents Foul Plugs. The beveled top edge and central groove keeps oil from the combustion chamber—reduces carbon. Dealers—Write for the details.

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Models range from the 2,000-lb. Speed Truck to the 10,000-lb. truck. Some territory is still open for dealers.

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The Self Locking Radiator Cap

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*Silent Timing*  
**GEARS**

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DURABLE  
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**"BEACON SYSTEM"**

Electric or hand operated. Five or ten-gallon full visible pumps. Ten models visible pumps, twenty models roadway and oil pumps.

Write for Catalog No. 15.

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*Finer Motor Cars*  *At Lower Prices*

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Over 500 Service Stations in 500 Centers

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Oversizes      Standards      Specials

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**K-D Valve Spring**  
**Lifters**

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PRICE  
\$2.50  
EXTRA JAWS  
"Universal" Type

**UNIVERSAL HOSE CLAMP**

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**REAMER**



Double  
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Made by TOOL-MAKERS. Circular.  
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WITH  
DETACHABLE  
PILOT

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Manufacturers of Automotive Equipment, Drills, Punches, Shears, Shrinkers, Countershafts, Grinders, Buffers, Forges, Blowers, Tuyere Irons and Blast Gates.

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GENERATOR  
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FRENCH  
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ANY CAR      ANY MODEL      ANY YEAR



Single and wide face Tailor made high grade bumpers  
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Motorbloc makes men more productive

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Dust and Valve Cap  
Off or On in 5 Seconds

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Big Profits  
for the  
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GLB  
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Saves battery, lights, and generator.  
Guards charging line, cutout and ammeter.  
The details of this fast selling necessity will interest you. So will the prices.



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A good profit for you in this wonderful, fast-selling necessity. Ask your jobber or write.

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CYLINDER HONES  
Can be operated without removing engine from vehicles. An absolutely true hole. Small first cost. Large profits. Have efficiency of large, expensive grinders.



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Builders of the Original and Genuine Stutz Motor Cars

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Write for literature, price list and liberal  
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Every Ford and 490 Chevrolet should install the R. & R. Automatic Grease Retainer, the only Grease Retainer with automatic takeup. Easily installed and requires No Special Tools.  
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DEALERS—Write for our proposition

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ONLY  
HEAT"

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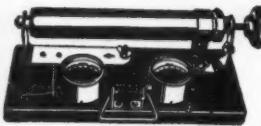
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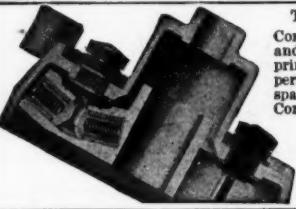
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OVER 50 WONDERFUL SHORT CUTS  
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# USED AUTO PARTS

We have wrecked  
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**ALUMINITE PISTONS and  
Connecting rods for all  
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**FORD SPEED SPECIALTIES**  
Special ALUMINITE racing  
pistons for Ford motor  
(12 oz.)

**HIGH SPEED CAMSHAFTS**  
POWER-PLUS cylinder head  
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**IRON REPLACEMENT  
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Mail Orders Given Prompt Attention

"No Leak O" Piston Rings, nearly all sizes,  
packed twelve in a box, any quantity at 50%  
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**NEW PARTS FOR ALL CARS**  
Axle Shafts, Bearings, Gears, Universal Joints,  
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2000 Models  
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ESTABLISHED 1894  
**EXPERT CYLINDER AND CRANKSHAFT RE-GRINDING**  
**SPECIAL LIGHT WEIGHT  
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Nearly 3,000,000 Auto Parts.  
Why buy new parts, when we can  
SAVE YOU 50% to 75% off list?  
Parts for all models, Maxwell, Overland, Stude-  
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## DEALERS

Get our rock bottom prices on  
**ATCO TIRES AND TUBES**  
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REBUILT AND NEW ELECTRIC MOTORS, GEN-  
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bought and exchanged. Our rebuilt motors stand every  
test of new motors; 8000 always in stock; send for  
stock list. Write what you want or have to sell.

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to determine patentability and validity. Patent suits  
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## PATENTS—TRADEMARKS

A strictly professional service for inventors and manu-  
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ESTABLISHED 1864

## PATENTS

BOOKLET FREE HIGHEST REFERENCES  
PROMPTNESS ASSURED BEST RESULTS  
Send drawing or model for examination  
and report as to patentability  
**WATSON E. COLEMAN, Patent Lawyer**  
624 F Street N. W., Washington, D. C.

## FINEST AUTO POLISH FOR 35c A GALLON!

You don't believe it? We'll show you.  
We'll sell you our formula for your exclusive  
use. Easy made. Send for free sample and  
try it, right now.

**ROWE AND TAYLOR**  
Chemists, 433 Central Bank, Memphis, Tenn.

## AUTO INDUSTRY MAILING LISTS

Send to headquarters for dependable lists of Auto-  
mobile Owners, Dealers, Accessories, Garages, Tire and  
Battery Stations, Truck Fleet Owners, Bus Lines, Taxi-  
cab Companies. Write for catalog and prices.

**MOTOR LIST COMPANY**  
Fourth & Grand 431 Howard St.  
Des Moines, Iowa Detroit, Mich.

\$100.00 to \$200.00  
A WEEK

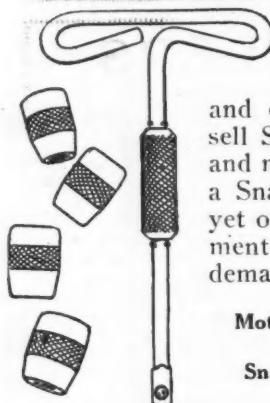
To Live Wire Agents and Salesmen. Only men  
of this calibre need apply. The biggest selling  
necessity for Fords on the market today. Terri-  
tories closing out fast.

**THE H. J. BORGmann CO.**  
Main Offices, Stamford, Conn.

PISTONS—RINGS—WRIST PINS  
SCORED CYLINDERS REPAIRED

# Snap-on

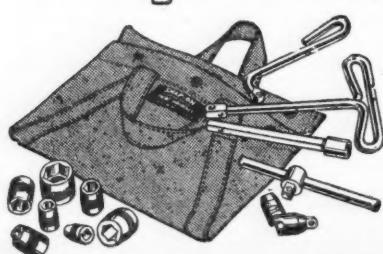
## INTERCHANGEABLE Socket Wrenches



Two or three Snap-on handles and a few sockets replace a dozen ordinary socket wrenches and cost less. That's why you can sell Snap-ons in assortments so easily and make big profits doing it. There's a Snap-on combination for every car, yet only a small stock at small investment is needed to meet nearly every demand. Write today and learn why.

**Motor Tool Specialty Co., Distributors**  
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**Snap-On Wrench Co., Manufacturers**  
Milwaukee, Wisconsin



Snap-on Leatheretic Kit-bags cost so little you can give them away, and they make it easy to sell a full equipment to every car owner. They're only one of many Snap-on features, too.



## 9 WAY HYDRAULIC SHOCK ABSORBERS

*(Formerly the Hydraulic Control)*

After all, it is service and satisfaction that count. Wife of business man returns from 400 mile trip in automobile equipped with our Hydraulic Spring Control, and reports, "This is the first long trip I have taken without severe backache." Is her husband a booster? Rather.

Users help you to sell. Good territory still open.

**AUTO SPRING CONTROL COMPANY**  
Jamestown  
New York

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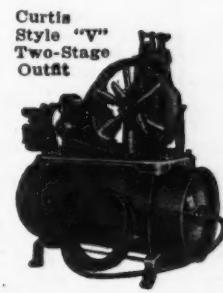
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## Child or Stepchild? An Analogy

Maximum pressure—tank storage capacity—motor characteristics—automatic starting duty—frequency of operation—these are but a few of the problems peculiar to air compressors for free air service in garages and filling stations. It is to the purchaser's own greatest interest and protection to see that his CURTIS compressor outfit is a genuine CURTIS factory built product, factory guaranteed, supplied and sponsored by a designing, engineering and manufacturing institution with a career of 69 successful years. When you purchase a CURTIS garage compressor outfit, built complete by the CURTIS organization in the CURTIS plant, your protection lies in the following facts:—

- 1—The proper relation and suitability of component parts. No misfit motors, switches and the like. Speeds, loads and capacities are right, starting loads are eliminated and there is a consequent freedom from trouble and expense which the chances favor in an amateur assembled outfit—a "stepchild" at best.
- 2—A complete unit tested as a unit under its own power in addition to the usual separate test of component parts; a final check-up under your actual running conditions duplicated in our shop.
- 3—The CURTIS guarantee covers the *entire unit* as a whole and the CURTIS organization stands back of it as a unit; no divided responsibility, no shifting of the blame for possible trouble later on,—"no passing of the buck."

### A Two-Stage Compressor Is Only as Good as its Intercooler



(a) COPPER Intercoolers with thin radiating fins rigidly attached are original with CURTIS two-stage compressors. One hundred and thirty-five per cent better heat-conducting properties than cast iron, 112% better than steel and 27% better than aluminum.

(b) CURTIS Intercoolers are approximately 50% longer and have about 100% more heat-radiating fins than competing designs.

(c) CURTIS Intercoolers are exposed their entire length to the cool blast of the fan flywheel.

All the features of the CURTIS Single-Stage, plus real two-stage efficiency



Style "X"  
Single-Stage  
Outfit  
Portable,  
Belted or  
Geared. Five  
sizes, A.C.  
or D.C. Motor.



Style "S"  
Single-Stage  
Outfit Belted  
only. Five  
sizes, 1/4 to 3  
H.P.

We manufacture a complete line of both single and two-stage air compressors. A style, size and arrangement to meet your particular need. Write at once for full details and prices.

### CURTIS PNEUMATIC MACHINERY CO.

1527 Kienlen Avenue

St. Louis, Mo., U. S. A.  
Branch Office 530-H Hudson Terminal, New York City.

Canadian Representative: Joseph St. Mars, Winnipeg and Toronto, Canada

### Curtis Pneumatic Machinery Co.

1527 Kienlen Ave., St. Louis, Mo.

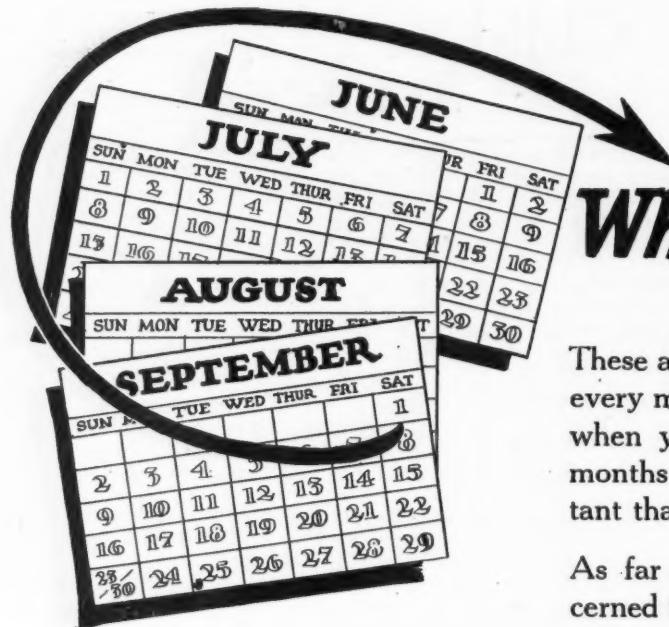
Gentlemen:—Please send me descriptive folder and full particulars on Curtis Air Compressors.

Name \_\_\_\_\_

Address \_\_\_\_\_

Jobber's Name \_\_\_\_\_

Address \_\_\_\_\_



## When Speed Counts!

These are your heavy months when you're on your toes every minute getting out work. This is the time of year when you make most of your profits. During these months service on replacement parts is far more important than at any other time of the year.

As far as transmission and differential gears are concerned the problem is solved when you begin taking advantage of Double Diamond "Nationalized Gear Service." One of our eight sales branches or one of our many jobbers is within easy reach, no matter where you are located. Complete stocks for practically all cars are kept on hand and all orders are shipped out the same day received. This is the kind of service you need when speed counts.

With every gear goes a positive guarantee of satisfactory service. You are not required to take chances.

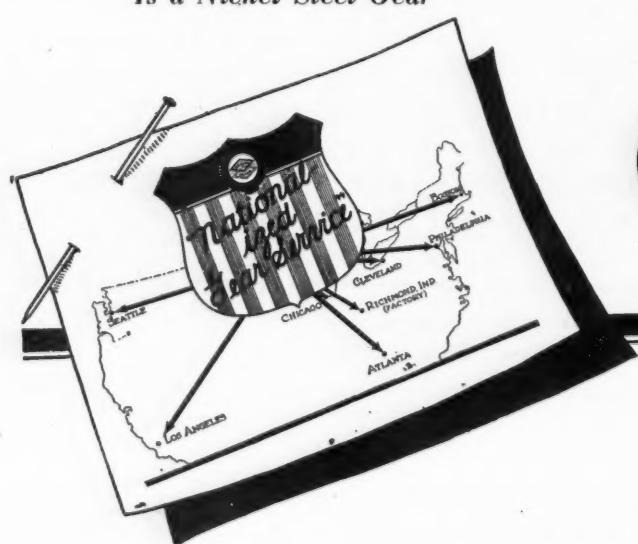
We also supply fly wheel starter ring gears, rear axle shafts and silent timing gears for practically all cars. Order from our nearest sales branch or jobber. Write for complete price list.

### AUTOMOTIVE GEAR WORKS, Inc.

Factory and General Offices: Richmond, Ind.

Manufacturers of

# Double Diamond Gears



*"Every Double Diamond Gear  
Is a Nickel Steel Gear"*





*Skyhigh in quality*, the Williams Accelerator for Ford Cars is writing substantial profits into the records of dealers who sell it.

Almost two million Williams Accelerators have been sold —yet several million Ford cars are still unequipped.

To get this quick, *profitable* Ford business, stock Williams Accelerators. Talk Williams Accelerators. Display them. Order Williams Accelerators from your jobber *today*.

**WILLIAMS BROS. AIRCRAFT CORP.**

1211 VAN NESS AVENUE  
SAN FRANCISCO

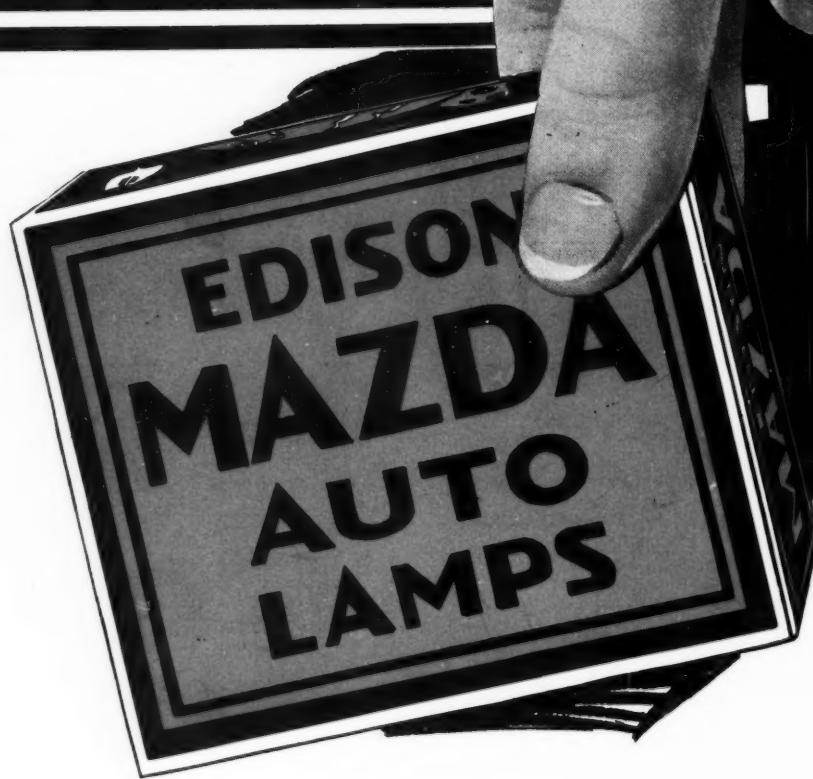
The Williams "Junior" Accelerator retails for \$1.50.  
Concentrate on the Williams Line.

*Williams Accelerator*

*williams  
accelerator*



Just show  
the kit~



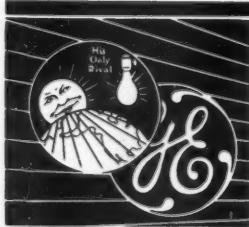
*It will sell itself*

YOU will find, as thousands of others have found, that just showing the Edison MAZDA Auto Lamp Kit means selling it,—selling six lamps instead of one.

The kit is small, stoutly built, and holds securely six spare lamps. Properly displayed, it will attract interest and multiply your sales.

You've seen it advertised in the leading national magazines. A growing consumer demand is thus being built for your benefit—don't fail to take advantage of it.

Your jobber will tell you how to tie up with the 1923 consumer advertising campaign,—better ask him, while this auto season is still young.



EDISON  
MAZDA LAMPS

A GENERAL ELECTRIC PRODUCT

P. O. 7567

